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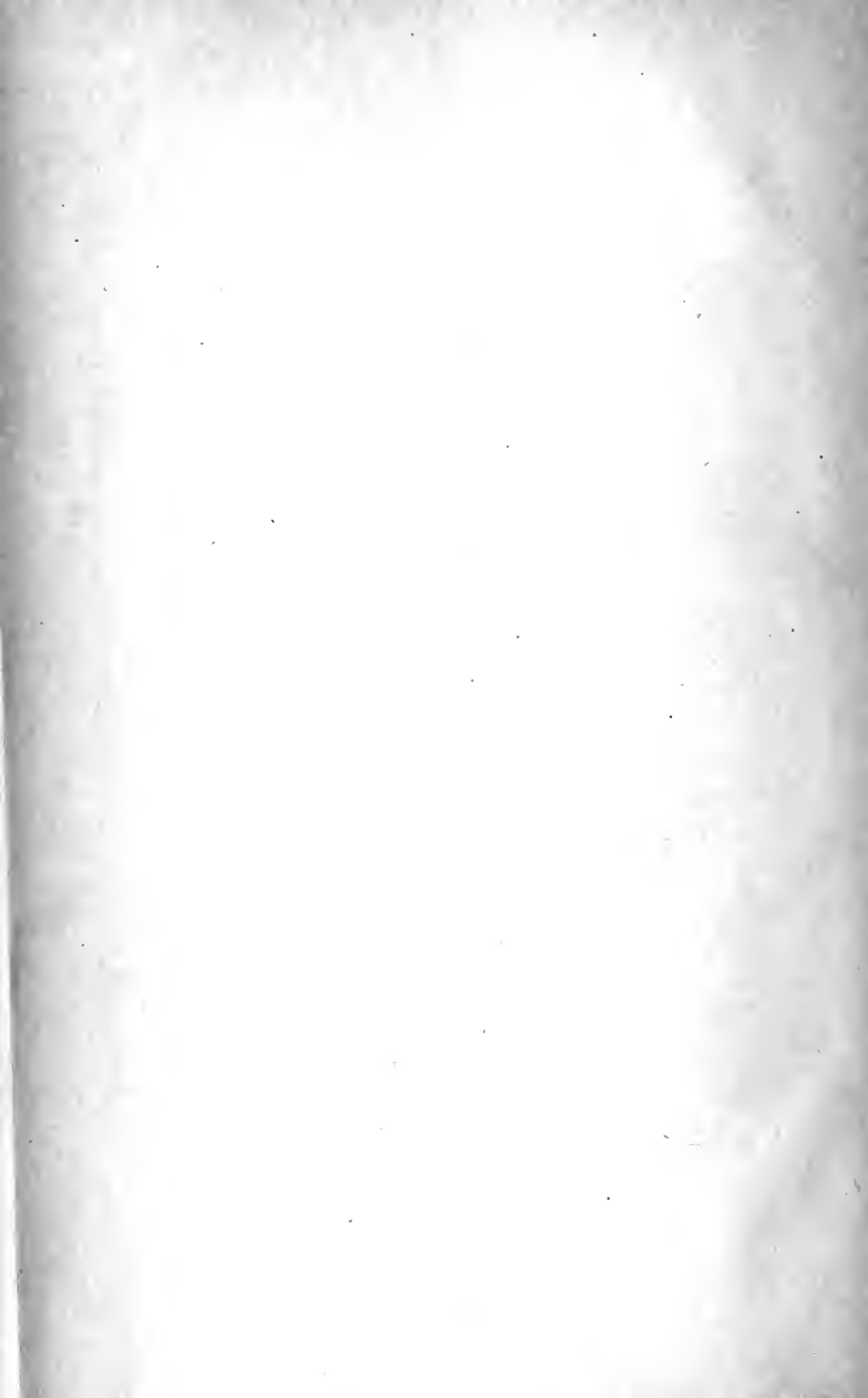
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SEVENTH BIENNIAL REPORT

OF THE

NORTH CAROLINA

BOARD OF HEALTH

1897-1898

RALEIGH :

Edwards & Broughton, Printers and Binders.

1899.

MEMBERS OF THE BOARD.

ELECTED BY THE MEDICAL SOCIETY OF THE STATE OF
NORTH CAROLINA.

GEORGE GILLET THOMAS, M. D., President.....Wilmington.
Term Expires 1899.

S. WESTRAY BATTLE, M. D.Asheville.
Term Expires 1899.

W. H. HARRELL, M. D.Williamston.
Term Expires 1899.

JOHN WHITEHEAD, M. D.Salisbury.
Term Expires 1899.

APPOINTED BY THE GOVERNOR.

C. J. O'HAGAN, M. D.Greenville.
Term Expires 1899.

J. D. SPICER, M. D. *.....Goldsboro.
Term Expires 1899

J. L. NICHOLSON, M. D.Richlands.
Term Expires 1899.

A. W. SHAFFER, Sanitary EngineerRaleigh.
Term Expires 1899.

RICHARD H. LEWIS, M. D., Secretary.....Raleigh.
Term Expires 1899.

* Resigned.

LIST OF COUNTY SUPERINTENDENTS OF HEALTH IN THE
STATE OF NORTH CAROLINA DECEMBER 31, 1898.

ALAMANCE—Dr. W. R. Goley, Graham.
ALEXANDER—Dr. T. F. Stevenson, Taylorsville.
ALLEGHANY—
ANSON—Dr. E. S. Ashe, Wadesboro.
ASHE—Dr. L. C. Gentry, Crumpler.
BEAUFORT—Dr. Joshua Tayloe, Washington.
BERTIE—Dr. H. V. Dunstan, Windsor.
BLADEN—Dr. Newton Robinson, Elizabethtown.
BRUNSWICK—Dr. D. B. McNeill, Supply.
BUNCOMBE—Dr. I. A. Harris, Jupiter.
BURKE—Dr. J. L. Laxton, Morganton.
CABARRUS—Dr. J. S. Lafferty, Concord.
CALDWELL—Dr. A. A. Kent, Lenoir.
CAMDEN—
CARTERET—Dr. F. M. Clarke, Beaufort.
CASWELL—
CATAWBA—Dr. D. M. Moser, Conover.
CHATHAM—Dr. H. T. Chapin, Pittsboro.
CHEROKEE—Dr. S. C. Heighway, Murphy.
CHOWAN—
CLAY—Dr. W. E. Sanderson, Haysville.
CLEVELAND—Dr. R. C. Ellis, Shelby.
COLUMBUS—Dr. J. F. Harrell, Whiteville.
CRAVEN—Dr. L. Duffy, Newbern.
CUMBERLAND—Dr. J. Vance McGougan, Fayetteville.
CURRITUCK—Dr. H. M. Shaw, Shawboro.
DARE—
DAVIDSON—Dr. John Thames, Lexington.
DAVIE—Dr. James McGuire, Mocksville.
DUPLIN—Dr. F. H. Arthur, Magnolia.
DURHAM—Dr. John M. Manning, Durham.
EDGECOMBE—Dr. L. L. Staton, Tarboro.
FORSYTH—Dr. John Bynum, Winston.
FRANKLIN—Dr. E. S. Foster, Louisburg.
GASTON—Dr. J. H. Jenkins, Dallas.
GATES—Dr. R. C. Smith, Gatesville.
GRAHAM—
GRANVILLE—Dr. G. A. Coggeshall, Oxford.

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- GREENE—Dr. Joseph E. Grimsley, Snow Hill.
GUILFORD—Dr. A. E. Ledbetter, Greensboro.
HALIFAX—Dr. I. E. Green, Weldon.
HARNETT—Dr. O. L. Denning, Dunn.
HAYWOOD—Dr. J. Howell Way, Waynesville.
HENDERSON—Dr. J. G. Waldrop, Hendersonville.
HERTFORD—Dr. John W. Tayloe, Union.
HYDE—
IREDELL—Dr. Henry F. Long, Statesville.
JACKSON—Dr. J. H. Wolff, Sylva.
JOHNSTON—Dr. L. D. Wharton, Smithfield.
JONES—Dr. S. E. Koonce, Pollocksville.
LENOIR—
LINCOLN—Dr. L. A. Crowell, Crimsic.
MCDOWELL—Dr. B. A. Cheek, Marion.
MACON—Dr. F. L. Siler, Franklin.
MADISON—Dr. Jas. K. Hardwicke, Marshall.
MARTIN—Dr. W. H. Harrell, Williamston.
MECKLENBURG—Dr. M. C. Strong, Charlotte.
MITCHELL—Dr. C. E. Smith, Bakersville.
MONTGOMERY—
MOORE—Dr. Gilbert McLeod, Carthage.
NASH—Dr. H. Brantley, Spring Hope.
NEW HANOVER—Dr. W. D. McMillan, Wilmington.
NORTHAMPTON—Dr. H. W. Lewis, Jackson.
ONSLow—Dr. E. L. Cox, Jacksonville.
ORANGE—Dr. C. D. Jones, Hillsboro.
PAMLICO—
PASQUOTANK—Dr. I. Fearing, Elizabeth City.
PENDER—Dr. George F. Lucas, Currie.
PERQUIMANS—Dr. C. C. Winslow, Winfall.
PERSON—Dr. J. A. Wise, Roxboro.
PITT—Dr. E. A. Moye, Greenville.
POLK—Dr. W. S. Green, Mill Spring.
RANDOLPH—Dr. T. T. Ferree, Ashboro.
RICHMOND—Dr. W. M. Fowlkes, Rockingham.
ROBESON—Dr. H. T. Pope, Lumberton.
ROCKINGHAM—Dr. Sam Ellington, Wentworth.
ROWAN—Dr. W. L. Crump, Salisbury.
RUTHERFORD—Dr. W. A. Thompson, Rutherfordton.
SAMPSON—Dr. R. E. Lee, Clinton.
STANLY—
STOKES—Dr. W. L. McCanless, Danbury.
SURRY—Dr. John R. Woltz, Dobson.
SWAIN—Dr. A. M. Bennett, Bryson City.

TRANSYLVANIA--Dr. M. M. King, Brevard.
TYRRELL--
UNION--Dr. J. E. Ashcraft, Monroe.
VANCE--Dr. W. J. Judd, Henderson.
WAKE--Dr. R. B. Ellis, Raleigh.
WARREN--Dr. T. B. Williams, Ridgeway.
WASHINGTON--Dr. W. H. Ward, Plymouth.
WATAUGA--Dr. W. B. Council, Boone.
WAYNE--Dr. Jas. H. Powell, Goldsboro.
WILKES--Dr. J. W. White, Wilkesboro.
WILSON--Dr. C. B. Walton, Wilson.
YADKIN--Dr. M. A. Royall, Yadkinville.
YANCEY--Dr. J. L. Ray, Burnsville.

LETTER OF TRANSMISSION.

NORTH CAROLINA BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
RALEIGH, January 3, 1899.

His Excellency, DANIEL L. RUSSELL,
Governor of North Carolina.

SIR:—In compliance with Section 3, Chapter 214, Laws of 1893, I have the honor to present this, the Seventh Biennial Report of the North Carolina Board of Health.

Very respectfully yours,

RICH'D H. LEWIS, M. D.,
Secretary and Treasurer.

SEVENTH BIENNIAL REPORT

OF THE

NORTH CAROLINA BOARD OF HEALTH,

1897-1898.

The first of the past two years was not marked by anything out of the usual in sanitary matters, but 1898 unfortunately brought with it small-pox, which has from time to time appeared in various sections of the State, although generally in a very mild form. The Board in the exercise of its advisory functions has assisted as far as possible the local authorities in its management. On the whole the management of the Superintendents has been good, and the disease has been kept within comparatively narrow limits. The indications, however, for the coming year are not reassuring, owing to the general indifference to vaccination—the most important element always in the contest with this disease, and peculiarly so in rural communities like our own where an effective quarantine is extremely difficult and often practically impossible. But although we move in a quiet way, we believe that our efforts are slowly, it is true, but surely making an impression on the minds and habits of our people. They are unquestionably more wide-awake to the fact that some diseases are preventable and more interested in the work of prevention than formerly.

A thorough inspection of the watersheds and works

of the public water supplies of the State was made by the Engineer of the Board, and an analysis, both chemical and bacteriological, of the waters made. This report published in the Bulletin was received with much interest, and the knowledge that they were watched doubtless had a good effect upon the water companies, for while "soulless corporations," there is a good deal of ordinary human nature in their managers.

The Monthly Bulletin has appeared regularly and promptly during the past twenty-four months, and becomes more and more useful as a medium of communication with all the physicians in the State and, in a limited way, of instruction to the people.

This modest publication of the Board seems to be read, both at home and abroad, it appears, as in a letter from the sanitary editor of one of the great papers of the country asking to be put on the mailing list, the statement was made that the writer had been told that it was the best in the United States. We make no such claim, but merely refer to the matter in order that your Excellency and the General Assembly may know that the work of your agents for the protection of the people's health meets with approval.

For lack of money the publication and distribution of literature in the form of pamphlets of a popular character on the more important subjects in sanitation have been kept in abeyance. This we have found probably our most effective agency in educating the people in hygiene, and trust that it can be resumed in the near future.

For the work of the Board in detail the reader is referred to the following pages.

MEETINGS OF THE BOARD.

MINUTES OF THE ANNUAL MEETING AT MOREHEAD CITY IN 1897.

ATLANTIC HOTEL,
MOREHEAD CITY, N. C., June 8, 1897.

The Board met in annual session at 4.30 p. m., with President Thomas in the chair. Present: Drs. C. J. O'Hagan, J. D. Spicer, Geo. G. Thomas. W. H. Harrell, Col. A. W. Shaffer and Dr. Richard H. Lewis.

On motion of Dr. C. J. O'Hagan, Drs. Thomas and Lewis were unanimously reelected President and Secretary, respectively.

On motion of Dr. Harrell it was ordered that the municipal water supplies of the State be examined chemically and bacteriologically during the current year; and, that the Engineer of the Board at his convenience collect, pack, and ship samples of the same; and at the same time make an inspection of, and report on the various water works and watersheds. Also that the Treasurer purchase necessary books for the Engineer.

Upon a statement by the Secretary that the issue of the 20,000 Health Pamphlets, ordered at the last annual meeting at Winston, had not been made for various reasons, Dr. O'Hagan moved that in view of the present embarrassed condition of the State Treasury, their publication be postponed to a more favorable time. Carried.

At the suggestion of the Secretary, the \$200 a year heretofore allowed him for clerical help, in view of the suspension of the distribution of Health Pamphlets, was, on motion, discontinued.

Col. Shaffer called attention to the fact that members of the Board being State officers were required by law to take the statutory oath of office, and it was thereupon agreed that each member should make this oath before his Superior Court Clerk and forward it to the Secretary of the Board, to be filed with the proper State official.

Adjourned to meet again at 10 p. m.

RICH'D H. LEWIS,
Secretary.

NIGHT SESSION.

The Board reconvened with the same members present as at the afternoon session.

Col. Shaffer was duly appointed to audit the accounts of the Treasurer at his convenience after his return to Raleigh.

The continuance of the publication of the Bulletin was discussed, and, upon motion, it was ordered continued in a form to be modified by the Secretary.

On motion of Dr. Nicholson, the issue of the Bulletin was ordered increased to a number sufficient to allow one copy for every registered physician in the State.

On motion, Goldsboro was selected as the place for the next Health Conference, the time to be fixed by the President and Secretary after consultation with the local health officials.

On motion of Col. Shaffer, the Secretary was designated to attend the next meeting of the National Conference of State and Provincial Boards of Health at Nashville, Tenn.

On motion of Dr. Nicholson, Col. Shaffer was designated to attend meeting of Sanitary Engineers.

On motion, the Board adjourned to meet at Goldsboro.

RICH'D H. LEWIS,
Secretary.

CONJOINT SESSION

WITH THE

MEDICAL SOCIETY OF THE STATE OF NORTH CAROLINA,

AT

MOREHEAD CITY, JUNE 9, 1897.

The conjoint session was called to order by the President, Dr. G. G. Thomas, who said:

The State Board of Health is so thoroughly in the hands of the Secretary that an address from your President seems an imposition on your time. I wish that the entire membership would stay, for the questions of sanitation are certainly as interesting and as important as surgery or medicine. This Board, you know, works under great difficulties, often against the adverse criticism of politicians. It looks now to those of us who are studying the signs of the times that we are now getting nearer the promised land. Several years ago, as you are aware, the Health Conference was instituted, and only a lack of means has made the conferences so few in number. We believe that they have accomplished a great deal. If they haven't taught any great lesson to the people, they have made them think. In every community we have entered, we feel sure that we have left some seeds which will grow into a harvest of indefinite size. I have only one thing I wish to say, and that is in regard to the extension of the State Law in regard to communicable diseases. Last year at a meeting of the Board at Winston, I took occasion to remark that it would be a good thing to add measles to the list of quarantinable diseases. This is not a move that will commend itself to the general practitioner, and more especially to the elders in the profession. I say it with all becoming respect and reverence for these gentlemen. They generally agree with what I have heard said of a surgeon in one of the Confederate camps who went into the hospital and found a great number of country lads who had never been exposed to the poison of measles, and they were very sick. Another day brought an increase, and another day still more, and the surgeon wanted to know what in the world their mothers meant when they did not see that they had had measles in their childhood. That

expression, I am sorry to say, is common among the profession, notwithstanding the fact that the death rate is large. I do not know the statistics of the last epidemic, but I know that there are many saddened households left by that last march through the country. According to Stevenson and Murphy, mortality in Great Britain and Wales amounted to the large number of from six to ten thousand deaths in different epidemics. This does not take into account the number of people who were left with serious pulmonary trouble, and otherwise disabled. I believe in towns of any size it is possible to quarantine measles as easily as scarlet fever. It does not require so much care to quarantine from scarlet fever, now that it is recognized that the law is fixed. I know that the ravages of measles were marked by a great deal of disaster, coming as it did at a very inopportune season—in winter. I think it would be wise for the conjoint session to consider whether measles should not be added to the list of diseases that must be quarantined. So far as other diseases, whooping-cough, mumps, chicken-pox, etc., are concerned, they might wait later. People will have to be educated up to this, and present education will not allow stringent measures to be adopted, but I think it will be a progressive step if the Board of Health adds measles to the list of quarantinable diseases. I believe that the time is coming when we will have to take this step.

DR. O'HAGAN.—I think my friend must have meant something personal when he mentioned the Confederate surgeon. I think the first step that ought to be taken should be to make it compulsory with every family to see that they had measles. Such, I have no doubt, is directly antagonistic with your views on the subject. If my friend Dr. Thomas had had to go through with the terrible ordeal of bringing three regiments through in 1861, and didn't agree with me in this, he would at least sympathize with me. This is preliminary to my idea of putting measles on the black list. I do not think it will do. The prevailing feeling is that it is not a very formidable disease. The popular view will not support it; and I do not think it is best to push things too far, for there is danger of kicking. There is a wholesome dread of scarlet fever in the popular mind, and they don't object to any restrictions on that, and also on diphtheria. Typhoid fever can be quarantined, but we must not interfere with measles and whooping-cough; they belong to the domestic faculty, and we must not intrude upon the premises of their rights.

There is a matter of great importance for discussion now and that is the utter inefficiency of the County Superintendents of Health, and the carelessness and indifference to making monthly reports even remotely or approximately correct. I am tolerably well acquainted with the work of the County Superintendent of Health in

our county, and I think you will agree with the statement I am about to make. I regret to say that politics enters too much in the choice of these Superintendents; they go into it for what they can make out of the office, and that is not a great deal. As to getting reliable statistics, their labors are utterly useless. Those from my county are not worth one cent, and I have no doubt that you gentlemen from the other counties will corroborate my statement. I do not know how it is to be remedied. It is almost impossible to get any reliable information. However, we are just at the beginning of this work, and I hope we will improve, but I have no suggestions to make in regard to the improvement. Young men are optimistic and old men are pessimistic. I think the first step toward getting any correct data or any legislation upon it, would be to urge upon the County Superintendent of Health the importance of absolute accuracy in the monthly reports. I know that those from my own county are utterly worthless, and I have no doubt that it is true from all others, with the exception, perhaps, of Wilmington.

DR. BURROUGHS.—I have listened to the remarks in regard to the quarantining of measles, and I have listened to what Dr. O'Hagan has said. I think that measles is a disease of more gravity than most physicians regard it, and it is the duty of the Board of Health to quarantine measles whenever practicable. Measles gets into a community, it prostrates the majority of the inhabitants, and I know of no better way of illustrating the use of quarantine than by giving you an instance of two schools of which I have the honor to be the physician. One has about one hundred and forty to one hundred and sixty girls, and the other two hundred to two hundred and twenty-five young ladies. Measles last year got into this school of older girls, and 63 of them had it and were kept from their studies. Several developed pneumonia in connection with catarrhal bronchitis. It kept them from their classes, and some of them had to be sent home, and it demoralized the whole school. The other school quarantined against the Normal and Collegiate Institute, in which the measles appeared, and I visited first the school that had no measles. As a result the smaller school, though only 89 yards away and with 150 girls, developed not a single case. They were allowed to go on with their work. I think something of this kind could be done in keeping it from household to household. It is carelessness on the part of the health officers to allow measles to become scattered over a town. If you have a thorough quarantine at first, the disease will be easy to control. Unless you come in contact with it, you don't get it. If you would quarantine it just as you do scarlet fever we would not have so many constitutions undermined and so many cases of catarrh and pneumonia, laying the way for invasion by tubercular bacilli. I am in favor of quarantining measles.

DR. MURPHY.—I am inclined to agree with both gentlemen. I have had pretty much the same experience that Dr. O'Hagan has had. I have gone through with two epidemics of it in the hospital for the insane. I had the impression that measles was contagious, and that all would have it, so I made no effort to quarantine. About that time I visited the Georgia hospital, where they have about two thousand patients. The doctor told me that some of his nurses had measles and they were trying to keep it from spreading. I said that that was useless. He said he was going to do it anyway, and sometime afterwards I asked him the result, and he said they had not had another case. So it seems to be of some use. In that hospital there are quite a number of buildings and they are all mixed up, and I don't even now understand how he did it, but he is a truthful man.

DR. MUNROE.—While I think that measles should be quarantined, and that inside of five years we will quarantine measles, I doubt whether the public mind is educated up to that point yet. In regard to the mortuary statistics, the trouble is to get competent men. In our section of the State, notwithstanding the registered physicians elect them, there is always a political scramble for the place. No reputable physician is going to try for it, and I believe that the people in the jail and in the poor house ought to have the best medical attention from the best medical talent in North Carolina.

¹⁸⁸⁸DR. McDOWELL.—There are only half a dozen physicians in a county that report to these County Superintendents of Health, and how are they going to make any report that way? They don't make any reports of contagious diseases or any mortuary statistics to health officer. I want to know if that is not our fault, I mean that we don't have better statistics. I know I have done very little reporting. If there is a case of scarlet fever, we telegraph him, and the quarantine takes place immediately. I think we ought to have a better organized county medical society in every county, and the work that came before them would be worth a great deal to the State Board of Health. It is with the physicians at large that this lies. I don't think the Superintendent of Health does anything now except attend to the poor house and jail. It seems to me that we as individual physicians could uphold the State Board of Health if we would pay the proper attention to our duties along this line. In these counties, it is a right hard matter to visit all parts of it and get the statistics and the number of cases of various diseases, and all this and the regulation of health matters, including the water supply, will rest with the physicians in the various localities. It might be easy to quarantine measles in a town, but if you try it in a country town the difficulties will increase. You never know any-

body has measles until the eruption appears. All the other children are in school with this child, and who is going to be quarantined? All his playmates and associates in school have flocked around him to sympathize with him because he is not feeling well, and have all become poisoned. Every child there has come in contact with him. You do not see but about one in ten who has measles, and it is almost impossible to quarantine. In a family where the daily bread is dependent on the labor of the father or the mother or some of the larger children, none of whom have had measles, what are you going to do? In factory towns where most of the children work in factories, suppose you have them quarantined, how are you going to feed all these people? How are you going to take care of them? With the mother and larger children working for their daily bread, it seems to me that in a town of one hundred families of this kind, with two or three thousand inhabitants, you will have a hard time to support these people, and it seems to me to be almost impossible to quarantine in small towns.

DR. BURROUGHS.—It is no more trouble to quarantine a small town than it is any other. If you quarantine the first cases, you can get hold of the others pretty soon. As soon as the people realize that measles is a contagious disease and that the children who have it will be stopped from school, they will recognize it as such and send for a doctor at once, and the thing will be easily put under control. In regard to mortuary and vital statistics. There is no way of getting them without further legislation. You must have township cemeteries, and a man in charge of each who would give a certificate of death for each one buried. There is no other way of reaching the mortuary statistics but by having township and not church and private burying grounds.

DR. THOMAS.—I want to say a little more about this quarantine. If you didn't quarantine in diphtheria and scarlet fever, you would have just as wide-spread an epidemic as you would in measles. The public mind has more dread of these two because they are more mortal. I still believe a great deal could be done in the counties if the physicians who by law constitute the County Board of Health would have readings and discussions of these questions and urge the Superintendents to more work. Your mortuary statistics will be more thoroughly quoted. In our organization the thing had to be done in years and years; it is not a thing which can be done in months. I believe that now the work of this Society and the Board of Health is being appreciated by the people of North Carolina. I would like for the question to be still further agitated.

The reading of the Annual Report of the Secretary was then called for, and was as follows:

REPORT OF THE SECRETARY OF THE NORTH CAROLINA BOARD OF HEALTH FOR THE YEAR 1896-'97.

RICHARD H. LEWIS, M. D., RALEIGH, N. C.

Since our last annual meeting the Board has accomplished rather more work than during any period of the same length in its history. A statement of most of this in detail will be found in the Sixth Biennial Report covering the part of 1896 belonging to our society year, and therefore it would be a work of supererogation to do more now than simply recapitulate what was done. Owing to the extent of this work the appropriation for 1896, together with the balance on hand from 1895, was more than exhausted, so that a good deal of the expense had to be met out of the appropriation for the current year. In consequence of that fact we have not been able to undertake, since the first of January last, anything outside the usual routine. Practically, therefore, a full statement of all the work for our past fiscal year will be found in the Biennial Report.

With the exception of the convict camps which had to be omitted for want of money to pay the necessary expenses incident thereto, all the State Institutions were visited and inspected by Committees from the Board appointed by the President for the purpose, viz: The North Carolina Asylum for the Insane, the Institution for the Deaf, Dumb and the Blind at Raleigh, the Penitentiary, the State Capitol, the University, the College of Agriculture and the Mechanic Arts, the State Normal and Industrial College—twice, once to specifically advise as to the best method of sewage disposal and once to make a general inspection—the Agricultural and

Mechanical College for the Colored Race, the School for the Deaf and Dumb and the State Hospital, at Morganton, the Eastern Hospital at Goldsboro and the Oxford Orphan Asylum. In addition, upon request, the Board advised the proper authorities as to the best method of sewage disposal for a new building recently erected for the medical department at Davidson College; and the County Commissioners of Johnston County in regard to the removal of the jail to another site.

Believing the purity of all drinking water, and especially of the public water supplies, to be of paramount importance to the public health, and realizing that many of the municipal supplies in our State, owing to the source of supply, were peculiarly liable to contamination, the Board at the last annual meeting ordered an examination made of them. This was done, not with the expectation of doing anything like thorough work (our limited appropriation forbidding that) but for the moral effect upon the water companies that would be produced by the simple knowledge of the fact that the State, having more regard for the lives and health of its citizens, their consumers, than for the size of their dividends, had an eye upon them. In obedience to this order a bacteriological examination was made of all the municipal supplies in the State. Of the fifteen, four were found to contain intestinal bacilli, and four to be suspicious, and were so reported by the Secretary to the Board at a meeting held in Charlotte on October 15, '96, at the time of the Health Conference there. As the result of this report, the Secretary was instructed to have made immediately another bacteriological and a chemical analysis of all the infected and suspicious waters; and he was further ordered, in those cases where the water was shown to be still bad, to notify the Superintendent of Health, the Mayor and the man-

ager of the water works of the fact, and call upon them in the interest of the public health to remedy the trouble, and, if he did not receive satisfactory assurance within thirty days that this had been done, to have the analyses published in the local papers for the information of the people using said waters. While seven or eight sent samples for the bacteriological examination—the Board furnishing the sterilized bottle—only two sent samples for the chemical examination. This second examination revealed the gratifying fact that the intestinal bacilli had disappeared in every instance, and the condition of the various waters was much improved.

In view of the difficulties of one kind and another encountered by your Secretary in obtaining samples rightly packed and shipped in the investigations referred to, he would respectfully suggest that in case of another such examination that the samples be collected, packed and shipped by a member of the Board. Although this would add materially to the expense, it would, in his opinion, be money well spent as the works, including watershed, could at the same time be inspected.

Besides these examinations of municipal water supplies, bacteriological analyses were made of three seriously suspected wells, one at the Oxford Orphan Asylum, one in Asheville, and one in Burlington, and the water of each was found to be unfit for use.

Samples of water from a well in Oxford, one in Rowan County, and one in Winston, containing insects and worms visible to the naked eye were sent to the Secretary for an opinion. He being no entomologist, requested Dr. H. V. Wilson, the able Professor of Biology in the University, to make the identification for him. This he courteously and cheerfully did without charge, and deserves the thanks of the Board.

In order to take stock and strike some kind of balance.

so to speak, your Secretary addressed a circular letter to several hundred physicians residing in the eastern section of the State, asking their opinion as to what effect in the matter of improving the drinking water and preventing sickness and death had been produced by the pamphlet on Drinking Water in its Relation to Malarial Diseases which, together with other Health pamphlets, had been widely distributed in 1895. Only fifty-six replies were received up to the end of the year and the evidence was, in the nature of the case, far from ideal in quality, but it nevertheless plainly showed that in a great many instances a better domestic water supply had been provided, and that much good had been accomplished in the saving of health and life.

In October last Dr. R. H. Whitehead, of the Medical Department of the University, kindly offered through the Board to make for any physician desiring it, free of charge, the serum diagnosis test for typhoid fever and "to make the laboratory useful in any other way so far as my (his) time will permit." His generous offer was accepted with thanks, and notice thereof with directions was given through the Bulletin, a copy of which is mailed monthly to every member of the State Medical Society. Very few, however, we regret to learn, availed themselves of the offer.

With the beginning of 1896 a new departure in the collection of vital statistics was made for the purpose of securing more trustworthy reports, by requesting reporters to sign at the bottom of each monthly report a certificate to the effect that the report included "the whole number of deaths occurring in the corporate limits during the above month." Since that time twenty-four of the twenty-seven towns making mortuary reports have certified to the accuracy of their reports. A consideration of these more reliable statistics has confirmed

the fact to which attention was called in the Fifth Biennial Report, that the death rate from tuberculosis was very much higher among the negroes than among the whites—to be exact the proportion in 1896 was 3.33 to 1. The statement made in the same report that the negro seemed to be much less susceptible to diphtheria than the white man, the number of deaths from that disease recorded in the two years 1893-'94 being whites 22, colored 0, was also confirmed by the figures of 1896, the deaths from diphtheria during that year being, respectively, 13 and 1.

As has been the case every two years since the Board was organized, the meeting of the Legislature was anticipated with more or less uneasiness. Subsequent events, however, did not justify the feeling, for no hostility to the Board and its work materialized. It is true that the law was so amended as to take the election of the County Superintendent of Health out of the hands of the County Board of Health and give it to the County Commissioners, and at the same time give them absolute control of the salary of the Superintendent, but while, looking at the matter from every point of view the change, in our best judgment, was inadvisable, still the reasonableness of the contention that the body paying an official should have the selection of that official and the fixing of his salary, looked at from the point of view of the business man, can not be denied. With this exception the Act Relating to the Board of Health was not interfered with. In the matter of new legislation along sanitary lines an attempt was made to have laws enacted for the Prevention of Blindness, for Compulsory Vaccination, and for the Protection of Public Water Supplies, bills for the two latter being prepared by your Secretary, at the request of the Hon. Thos. H. Sutton, one of the Members of the House from Cumber-

land. The first named was still-born, the second was promptly defeated, and the last, while it was reported favorably by the Committee on Public Health, and was endorsed by every one approached on the subject, could not be gotten up, owing to the press of other business in the last month of the session. In this connection we feel that our acknowledgments are due to many enlightened friends of all parties, and to none more than to Dr. Abner Alexander, of Tyrrell, who was always keenly alive to the value and importance of our health and medical laws.

In conclusion it is due His Excellency, Governor Russell, that we should express our appreciation of his evident desire to keep politics out of the Board, as shown by the truly non-partisan appointments of members to fill the vacancies caused by the expiration of the present incumbents. We trust that this may ever remain so, whatever the political faith of our Chief Executive, and that the usefulness of the Board may remain unimpaired.

MINUTES OF THE ANNUAL MEETING AT CHARLOTTE IN 1898.

BUFORD HOTEL,
CHARLOTTE, N. C., May 3, 1898.

Annual meeting of the Board. Present: Drs. O'Hagan, Battle and Nicholson, Col. Shaffer and the Secretary.

In the absence of the President, Dr. O'Hagan was called to the chair.

The minutes of the last annual meeting were read and approved.

The report of the Engineer of the Board, Col. Shaffer,

on the public water supplies of the State, was read and discussed.

On motion, the Secretary was instructed, after consultation with the Engineer, to devote one issue of the Bulletin, or so much thereof as may be necessary, to the publication of said report, together with the chemical and bacteriological analyses of the samples of the various water supplies; and to send a copy to the Mayor and Board of Aldermen of the respective towns.

On motion, the President and Secretary were appointed delegates to the annual meeting of the National Conference of State and Provincial Boards of Health, and Col. Shaffer as delegate to the American Public Health Association.

On motion, it was ordered that the public institutions of the State be inspected, and their sanitary condition be reported on by committees of two from the Board, to be appointed by the President.

Col. Shaffer, who was appointed a committee of one to audit the account of the Treasurer, reported it correct.

On motion, the Board adjourned to meet at the Conjoint Session to-morrow at 12 m.

RICH'D H. LEWIS,

Secretary.

CONJOINT SESSION WITH THE MEDICAL SOCIETY OF THE STATE OF NORTH CAROLINA AT CHARLOTTE, MAY 4, 1898.

The special hour having arrived, the Conjoint Session of the Board of Health was announced, and in the absence of the President, Dr. S. Westray Battle, of the Board, was called to the chair.

The Secretary read his report, which, after a full discussion, was ordered printed.

ANNUAL REPORT OF THE SECRETARY OF
THE NORTH CAROLINA BOARD OF HEALTH,
1897-'98.

BY RICHARD H. LEWIS, M. D., RALEIGH, N. C.

The past year has of necessity been less active than the years immediately preceding. Our work being largely educational, prosecuted chiefly by the free distribution among the people of health pamphlets on sanitary subjects, has been—temporarily we hope—suspended for want of funds to pay for the printing. To meet this difficulty, as far as possible, it will be remembered that the Board ordered at its last annual meeting at Morehead in June last, that the character of the Monthly Bulletin be somewhat changed by omitting certain statistical tables and inserting in lieu thereof reading matter that might be of more interest and profit. Not being able to mail a copy to everybody, it was thought best—as the physicians, especially those living in the country, largely control public sentiment in all medical and kindred matters—to send it free of charge to every registered physician in the State. Owing to the inability, in spite of earnest efforts, to secure a complete list of the physicians, the execution of this order was postponed until the September issue. Since that time the Bulletin has been mailed regularly to every doctor whose name was on the register a year ago. In this connection it would be proper to allude to the complaints generally made by County Superintendents of the failure on the part of the physicians to report to them, and the plan adopted to overcome this apparent indifference. Hoping that the failure to report was more the result of thoughtlessness or forgetfulness rather than actual indifference, and that a monthly reminder might help matters, I have since the November

issue printed on the last page of the Bulletin the usual blank, with the request to the reader to fill it out and mail it to his County Superintendent by the 3d of the month for use in making up his report to me. While it sometimes happens, owing to press of work with the State printer, that the Bulletin does not reach its destination as early as it should, it doubtless generally does on or before the 3d, but we fear that it has brought no material improvement.

INSPECTION OF WATER SUPPLIES.

Believing that the mere analysis of the waters of the public supplies of the State ordered by the Board at the Winston meeting two years ago had been of benefit by the intimation it conveyed to the water companies that some one had an eye on them, it was decided at the Morehead meeting to repeat the work, but more thoroughly. The plan first adopted of having the sample of water taken and shipped by the local health officer having been found in more than one instance unsatisfactory, and an inspection of the works and watersheds by a responsible and disinterested person being deemed desirable, Col. A. W. Shaffer, the Engineer of the Board, was requested to make such inspections, and while doing so to take and ship in a proper manner samples of the various waters to the State Experiment Station for a chemical, and to the bacteriologists of the Board for a biological analysis. Col. Shaffer did this work in his usual thorough and painstaking manner, and I regret to say, found not a few things deserving of criticism. In the course of his examinations he made it a point to learn water rates. He found that they were from 10 to 75 cents per 1,000 gallons to small consumers, with, in some cases, a required minimum consumption amounting to not less than \$1 per month. This, of course, means prohibition of the use of the public sup-

ply to the poor except where public fountains are provided. Although these supplies in our State are not as a rule, first-class, the water in nearly every instance is safer than that of the wells, and it should be within the reach of all. If there is anything more than another except air, to which every man is entitled, it is an abundance of good water. I doubt if the Board could do a better work than to inaugurate and prosecute a crusade for free water—at any rate, water as cheap as possible—for those of our people in the larger towns not blessed with an abundance of this world's goods.

YELLOW FEVER.

The epidemic of this disease occurring last summer and fall on the Gulf while, fortunately, it did not extend to our borders, was a constant source of anxiety to the authorities of our city of Wilmington, which was liable to infection. During the prevalence of the epidemic, the following correspondence, which explains itself, occurred:

RALEIGH, N. C., September 22, 1897.

DR. R. H. LEWIS, *Secretary State Board of Health, Raleigh, N. C.*

DEAR SIR: I am directed by the Governor to enclose you this letter from Surgeon-General Williams for your consideration and advice in the matter.

The Governor would suggest that while this invitation, if extended, might be productive of inducing some men of means to make their homes in Western Carolina, it might also result in bringing into our State large numbers of people without the means of subsistence while here and whose expenses in returning might have to be paid by our people.

Very truly yours,

J. E. ALEXANDER,
Private Secretary.

ASHEVILLE, N. C., September 18, 1897.

His Excellency, DANIEL L. RUSSELL, Governor.

DEAR SIR: If it meet with your approbation, I should be pleased to telegraph United States Marine Surgeon-General Wyman offering the

mountain plateau of Western North Carolina as a refuge for the refugees from the fever-stricken districts.

Very respectfully, your obedient servant,

JOHN H. WILLIAMS,
Surgeon-General N. C. S. G.

RALEIGH, N. C., September 22, 1897.

His Excellency, D. L. RUSSELL, Governor of North Carolina.

DEAR SIR: The letter of Surgeon-General Williams asking your approbation of the extension of an invitation to persons in the fever infected districts of the South to take refuge on "the mountain plateau of Western North Carolina," submitted to me for my "consideration and advice in the matter," was received this p. m.

Having duly considered the subject, I would respectfully say, in my opinion it would be unwise to extend the invitation. While I do not think that at this season of the year and at the elevation of our mountain plateau there would be any appreciable danger of conveying the disease of yellow fever to the residents, I do believe that it would be practically impossible to detain the refugees upon the plateau sufficiently long to prove that they were not infected, and that, therefore, there would be a distinct risk of some of them going to certain sections of our State that are susceptible to the disease—notably our city of Wilmington—and sowing the seeds of a serious epidemic. One section of the State might have to pay very dearly for the advertisement of another—to say nothing of the economical suggestion you make that a number of helpless people might have to be cared for at our expense.

The suggestion of Dr. Williams, looked at from the point of the whole State, is, to my mind, clearly unwise.

Very respectfully yours,

RICHARD H. LEWIS,
Secretary.

The principal lesson drawn from the epidemic was the unsatisfactory character of our present quarantine arrangements. The friction developed between the United Marine Hospital Service and the State quarantine officials was such as to satisfy nearly every one except some of the said State officials that National supervision and control of our maritime and interstate quarantine is greatly to be desired. This being an extremely important matter and the President of the Board, a resident of our principal seaport, and for many years on the Quarantine

Board of the same, holding identical views with myself on the subject, I thought it well in two numbers of the Bulletin to advocate those views, viz: National quarantine by the Marine Hospital Service. The past winter having been a very mild one—not sufficiently cold perhaps to kill the germs—it is to be feared that the disease may reappear with hot weather. Then, too, the communication with Cuba, that may be brought about by the war, is not reassuring. But, if, as a result of the war, the city of Havana can be put under the control of those who will enforce the proper sanitary regulations, its present menacing character as the breeding ground par-excellence of this disease, may be abolished.

SMALL-POX.

In the December Bulletin attention was called to the prevalence of small-pox in South Carolina and Georgia near our border, and Superintendents of those counties near the infected districts were exhorted to make the most of any scare that might exist among their people and vaccinate as many of them as possible.

The first case occurring in our State was reported in Wilmington on February 12th, in the person of a negro coming from South Carolina. In a few days another case, also a negro from South Carolina, occurred. Both recovered. In Charlotte there have been four cases—all negroes—with two deaths, origin of the disease also South Carolina. A young man from Georgia introduced the disease into his family in Clay County. Every member of the family, to the number of ten including himself, had it but none died. On March 2, a case in the person of a negro child from Alabama was reported near Gibsonville, in Alamance. On March 30th I was notified by the Superintendent of Health of a case in Salisbury; origin, Knoxville, Tenn. On April 14th the

Health Officer of Asheville notified me of a case there in a negro man ten days from Jacksonville, Fla. As there seems to have been no small-pox in that city, he probably contracted it en route through South Carolina. A few days later another case was reported from Asheville—a negro woman who, in the eruptive stage of the disease, had fled from South Carolina for fear of the pest house, and had been in hiding several days before being discovered. There have been, altogether, 21 cases of small-pox in North Carolina since February 12th—10 white and 11 colored, with two deaths among the latter.

With the exception of its extension to members of the immediate family of one case in Charlotte and of the Clay County case, there was no spread of the disease whatever. This speaks well for the faithfulness and efficiency of those having the responsibility of its prevention, and is very gratifying. But at the same time we should return thanks to the kind Providence that rules the affairs of men, for in some instances the authorities, owing to the determined, not to say violent, resistance of the people—the ignorant classes—were not able, or at any rate failed, to carry out the precautionary measures required; as, for example, in Wilmington, where the compulsory vaccination ordered was so violently resisted by the negroes as to cause the abandonment of the attempt. In Charlotte, however, the authorities were more successful. Acting Mayor Brevard sent a man who refused to be vaccinated to jail, and in consequence, and for other reasons, 17,000 it is estimated, were vaccinated. The unreasoning prejudice of ignorance is extremely difficult to meet, and sometimes requires a resort to methods that are very obnoxious to Americans. So we should make all due allowances for such failures.

HEALTH CONFERENCE.

The usual Annual Health Conference with the People was held in Goldsboro on October 14th. An excellent programme was prepared, but owing to the unavoidable absence of several of those who had promised papers, it was not as full as usual. Notwithstanding this and the rivalry of a popular theatrical troupe, the attendance and interest shown were gratifying, and we were assured that it had done good. Our former associate, Dr. Venable, kindly helped us out most materially with a valuable and interesting illustrated talk on "Bread."

FORMALDEHYDE DISINFECTION.

The importance of disinfection, thorough disinfection, in sanitation being so overwhelming, and believing disinfection by formaldehyde gas to be practically the best method, I devoted the November issue of the Bulletin to that subject. Every physician in the State received a copy in regular course, and I hope the interest of many was quickened; but knowing how often we are prevented from doing what we like for want of the necessary materials, I thought it well to send a copy to all the druggists in the State whose address could be obtained—more than 300—together with a letter requesting them to keep in stock the necessary apparatus for this method of disinfection, and asking them to let the public, and especially physicians, know that they had the apparatus.

PURE FOOD AND DRUG CONGRESS.

In obedience to orders from the President of the Board, I attended the meeting of the above in Washington, March 2-4. A large number of delegates representing practically every interest involved were present, and

seemed to be much in earnest. The Pure Food bill, which had already been introduced in the House by Mr. Brosius, of Pennsylvania, was amended by the Congress. A Committee was appointed to work for it, and, but for the war with Spain, some much-needed legislation on this line might have been obtained.

COUNTY SUPERINTENDENTS OF HEALTH.

It is with much regret that I have to announce the failure of ten counties to elect Superintendents since the power to elect was transferred by the last Legislature from the County Board of Health to the Board of County Commissioners. This is very discouraging. It is a retrogression that it is to be deplored. As the election, under the amended law, takes place annually on the first Monday in May, I mailed to the Boards of Commissioners referred to the following letter:

RALEIGH, April 27, 1898.

Board of County Commissioners—

GENTLEMEN: Not having any reports from your County Superintendent of Health for some time, I fear that you overlooked his election. I would respectfully call your attention to the fact that the law (chapter 214, Laws 1893.) is mandatory on the subject. As amended by the Legislature of 1897 the Superintendent "shall be chosen by the board of county commissioners of each county annually, on the first Monday in May of each year, and the said board of commissioners shall fix the compensation of said county superintendent of health."

It is very important to the health interests of the people that there should be such an official in each county (it being another name for county physician), and inasmuch as your honorable Board has absolute control of the selection of the officer and of his remuneration, I hope you will comply with the law and elect a Superintendent on Monday next. Please have your Secretary send me his name and address, and oblige.

Yours truly,

RICHARD H. LEWIS, M. D.,
Secretary.

In conclusion, I feel it my duty once more, to call upon the members of the Society and of the profession of the State in general, to lend us their invaluable aid in advanc-

ing our work. That work is, and must be for many years to come, chiefly educational. As intimated in the beginning of this report, in all medical and sanitary matters there is no influence comparable to that of the family physician. If every physician would make it his business to insist on his patients carrying out the ordinary sanitary precautions, the result in one year's time would be very great. Gentlemen, we count on your help in this glorious work of preventing disease and saving life.

DISCUSSION.

DR. LEWIS.—I would be glad to have any expressions of opinion in regard to the management of this health business, or suggestions as to what I might do to advance the cause of sanitation. Our hands are tied largely by the want of money in the State Treasury, which prevents the printing and distribution of the health pamphlets, which has been one most effective mode.

DR. FLETCHER.—I do not know that this is the time to do it, but I would like very much to see one thing in force, and that is some sort of compulsory vaccination law in North Carolina. Most of our towns have compulsory laws, but it is difficult to get them enforced. If we had a law similar to that in effect in some other States requiring every child before entering school to be successfully vaccinated, I think it would be a step in the right direction, and in a few years we would get everybody vaccinated. I don't know whether it is wise or expedient to burden Dr. Lewis with this.

DR. LEWIS.—I would like to say that I prepared a bill on that subject and had it introduced in the last Legislature, and that it was treated with absolute contempt. The only lever we would have upon the people would be to prevent the children from going to school if they

were not vaccinated. One practical difficulty on educational lines now is to get the children to go to school at all.

DR. HAIGH.—I requested our representative, Judge Sutton, before he left for Raleigh, to introduce such a bill, and he told me that he had gone to the Secretary and asked him to write it. There is one point about this matter that I think we might strike at right now. Why is it that the people are refusing to have their children vaccinated? Formerly there was no objection to it at all, and the virus we used was human virus and passed from the animal through the human system. The result of that was a modified condition. We got a virus that did not produce such violent results as the bovine virus does now. The point I want to make is this: The great fear has been all this year, especially from the violent results of the vaccination, that they will lose their arms and that the children will die. What is the cause of it? I do not know that I am right, but I do know this to be a fact. In using the virus, I have as far as I could selected those points having no color stain, and where I have done that, I have gotten a full vaccine result, and very little erysipelas and inflammation. I believe that you can go back to the origin of this. There has been such a demand for virus that they have been dipping too many points into one pock, and in that way, instead of getting pure virus, they have got pus mixed with it, the result of inflammation. If something could be done along that line, we would not produce this condition and set up such inflammation. Some of the points I sent back and asked to have them exchanged for pure ones, where not so many points had been dipped into the same pock. I think it has had a great deal to do with it. I do not think I vaccinated over a hundred people. I could not do anything with

them. I think if the matter could be taken entirely under control of the Board of Health, and have our Secretary get all the virus for the State from some one point where he was perfectly sure that it was good, and then send it out to the counties, we would get better results than we do now. I am quite sure as long as the results are as they are now, that the people will object to it.

DR. LEWIS.—In regard to the State Board furnishing the virus, I wish to say that some years ago we had a scare in a supposed case at Wadesboro. I “whooped it up” and tried to scare everybody to death, advertised that I had reliable virus on hand, and invested the Board’s money in 100 points. I could work off only about thirty.

DR. MINOR.—One point I would like to mention, and that is the tendency to advocate humanized virus. In my experience, the patients have always refused to be vaccinated unless I assured them that I had bovine virus.

DR. HAIGH.—I was not advocating the humanized virus. I was saying that there was no objection to that but that it was in a modified form as compared to bovine virus.

DR. BURROUGHS.—A great deal of prejudice lingering in the mind of the public is from using humanized virus. Poisoned arms gave our people a great deal of trouble during the Civil war.

I will just say for the benefit of the Society that they have had small-pox in South Carolina in close proximity to Asheville, and we strongly advised the vaccination of the whole town and quarantining against these places before Christmas. I went before the local Board of Health and strongly urged the importance of vaccinating the

whole town, especially the school children, before the opening of the schools, but they didn't.

I vaccinated about 3,800 since the last week in November, and I haven't made but one visit to see one person in that whole 3,800. Since we got that case of small-pox, I haven't vaccinated very many, because I already had them vaccinated. Since the scare came, I have vaccinated about 600. I used the National vaccine points, and 90 per cent of them have taken.

DR. ANDERSON.—In regard to the vaccine lymph in tubes. I wanted to be careful, and I wrote to Dr. Galloway, asking what he would advise, and to send me 100 points he could recommend, and he telegraphed to Chicago for these lymph tubes. We found them satisfactory, and recommend their use.

DR. FLETCHER.—I want to say a word just along the line of Dr. Haigh's remarks. It is only recently that the tubes have come out, but I found that many times the points would not take. Since I began to use the tubes, in 360 cases of primary vaccination with tubes, every one of them took. We had a few bad arms with severe inflammation, and some of them did not get well immediately. Some of them vaccinated in January are not well yet. We did not have erysipelas, but the arm was red and swollen to the elbow, and even the muscles below the elbow were swollen. It does not appear to be safest in every way, but it takes more effectually than the points.

DR. O'HAGAN.—It is a little singular that the remarkable discovery of Jenner, the value of which has been demonstrated time and time again, should find antagonists not only among the ignorant, but often among intelligent people; yet it is unfortunately so. A mode of overcoming this prejudice is yet to be discovered. You may talk what you please about virus and ivory points,

neither does it matter what variety of vaccine you use, you will find some cases where the peculiarity of the individual makes vaccination undesirable. I never saw a fiddler vaccinated in my life, and I have vaccinated many thousands of people. It makes little difference what kind of vaccine you use, or under what favorable circumstances you proffer to the masses of the people such an invaluable protection as this is, somehow or other, they will not accept it. I have been in the habit of preaching vaccination for the last thirty or forty years. Every year of my life I buy a few vaccine points and inform my patients that I have them there. I don't propose to vaccinate gratuitously. I do not propose to go around peddling these points and try to make the people pay me a dollar to vaccinate them, but I try to show the inestimable value of vaccination. I do not know anything in the world that will make them be vaccinated except a good small-pox scare. I do not know which way is best. I have vaccinated from arm to arm and have had delightful results, and again I have had very unpleasant ones. The President tells me he has used the lymph tubes in Newbern, and has had unpleasant results, and so here it goes.

In 1854 we had a terrible epidemic in our county, and I wrote to Wilmington for vaccine, and in reply received a very ugly little scab, but I vaccinated a great many and never had a single bad result. I have seen the most careful vaccination from the most reliable virus followed by remarkable consequences. The main question is to get the people to accept the protection. I know nothing in the world that will induce them to do so but a good first-class case of small-pox.

DR. DUFFY.—Dr. O'Hagan refers to the liquid virus, with which I had some little experience. I can't say, I am sorry, just where it was put up. I think it was

somewhere in Chicago. You may be familiar with it. You will find it in sealed glass tubes; a rubber tube comes with them. You break off both ends of the glass tube and attach the rubber tube to one end, and then by gently blowing through the latter, you get out a drop of the virus. Be careful to first disinfect the arm with alcohol. At first I took a razor, and without drawing blood, got off the epidermis and put a little drop of the virus upon one spot. I found that all of it, in almost every case, would strike in. I had very sore arms, and no matter how little I put, it seemed to give very sore arms. After some little experimenting with it as to how to do it, instead of putting it in one spot, I put it in three spots. It seemed to me that three small spots gave me less trouble than one, no matter how little I used.

One thing I want particularly to refer to, and that is the manner of dressing the arms. A great deal of the trouble in vaccination in my experience has come from the patient's hurting the arm in some way. It is difficult to avoid. The vaccination shields are not very good, for they slip around and are about as bad to press on the arm as anything else. I have tried bandages, going around under the pit of the arm to get some attachment, and all proved unsatisfactory until I took a piece of rubber adhesive plaster, about the size and shape of an ordinary envelope, and having attached tapes to the edges of it, fastened it to the arm opposite the vesicle. Then by placing rolls of absorbent cotton under the tapes next to their points of attachment they were lifted up and they could be tied over the dressing without exerting too much pressure. You can untie the tapes and dress the arm as often as may be desired.

DR. MURPHY.—I understood the Secretary to ask for advice to help him out. I don't know whether the Sec-

retary expects to vaccinate or not, but it seems to me that we have wandered off from the subject of advice. So far as I am concerned personally, I feel that we have our health affairs in the best hands in which we could put them, and I endorse fully what the Board of Health has done, and I recommend that they continue the Health Conferences about through the State. I would be glad to have them up in our part of the State this year.

DR. ———.— I appreciate the value of vaccination as a preventive of small-pox, but whereas the results we get from vaccination are better than small-pox, I must confess that the popular prejudice against vaccination is not wholly without justification. In our experience during last summer—I speak for myself and my associate—we used all the care we knew how to use. Thoroughly believing in the aseptic treatment of wounds, we would prepare the arm aseptically, both scrubbing the arm, at the point to be vaccinated, with hot water and then rinsing with alcohol, and with a sterilized knife making a slight abrasion, would dip the point into sterilized water and make the application of the virus. When through, we dressed the arm with a little sterilized gauze, this dressing to be removed again when the sore began to manifest itself. While we could not always follow up the after treatment of these cases, in quite a good per cent we did follow it. True, we did not lose any lives or any arms, but it must be confessed we did have quite a number of very bad arms. I know in the person of my own little daughter, whose case I watched carefully, she was for three days violently ill. She was carefully educated and trained as to the necessity of not scratching the place and thereby infecting it, and in spite of the care which had been taken, she had a high temperature and suffered a great deal of pain.

had constitutional disturbances and extensive eruption and was, in other words, quite sick. In one or two cases we were for a while really in great fear for their lives. Now I say this, that while I believe in vaccination and think it ought to be done and urge it, it seems to me that something ought to be done and some steps taken to secure a virus which is less active, and which will not produce such violent constitutional and local symptoms. When we can do that, I believe the public prejudice will to a great extent rapidly fade away. I am glad to hear what my friend Dr. Haigh said in regard to the selection of points, and I shall bear it in mind. I hope he will solve the difficulty. We thought possibly the trouble was that the virus was not sufficiently attenuated, had not passed through a large enough number of animals, but that was purely hypothetical with us, but certainly something was the matter. We used the National points. I would not vaccinate one of my children with an Alexander point, though others may be as bad.

DR. KENT.—When the doctor called out this discussion, I had hoped it would take a different turn. I have listened with a great deal of pleasure to the discussion of vaccination for small-pox, and yet I feel, as County Superintendent, that it has not been of as much value to me as if it had taken that turn. I am disposed yet to call out a different line of discussion, and endeavor as County Superintendent to derive some benefit from it. We meet around us far more evils that we know than those that we know not of. We know typhoid fever, we know measles, we all know consumption. We have them to do battle with almost continually, and if from our discussion here I can be better able to prevent a single case of typhoid fever in my county during the coming season, I believe I would be more benefitted by the

knowledge of how to do that, than I would by any knowledge of better vaccine virus, and for that reason, I desire to give the discussion that kind of a turn. Some weeks ago I had a gathering of the physicians in my county for the purpose of discussing what we might do to prevent the prevalence of typhoid fever in my county during the coming season. We discussed various means that we knew of, and resolved that we would appoint ourselves each a committee of one to do what he might in his especial community among his patrons to teach them how to live, and how to clean up the hot-beds of this disease around their houses, and how to obtain pure drinking water. And if any of the members here can make any suggestions to me that will enable me to more practically teach the people what to do to prevent the spread of typhoid fever during the coming season, I will certainly be greatly obliged.

DR. REYNOLDS.—I do not rise to discuss typhoid fever, but I have a few words to say about vaccination, and with your permission, I will return to that topic of discussion for a few minutes. It seems to me that a man when he is vaccinated has to have some constitutional disturbance, a sore arm, and be made sick, before he is successfully vaccinated. You might put the vaccine on a man's arm and have a little scar and a little irritation, and I would not call that man successfully vaccinated. I would not think he would be.

I remember having vaccinated one child in November, and it failed to take. I vaccinated it again in December, and it failed to take. I got that point from Dr. Burroughs. I vaccinated again in April with lymph, all in different places, and that took, and it set up a fire in all three places. I had three scars on that child's arm. I can state positively that I did not get any lymph in the other scars on that child's arm. I think Dr.

Glenn, who has gone around with me considerably, has witnessed a case similar to this one.

DR. GLENN.—I have seen a case like this where the scars would light up. It seems to be latent virus. I saw it in my own family. My brother was vaccinated more than a month ago. It did not take, and about six or eight days ago, I vaccinated him again with a lymph tube. When I left Asheville, that vaccination, which was more than an inch distant, and I am sure I did not touch it, was worse than the last place. I remember another case, that Dr. Reynolds called attention to first. Before this case of my brother's, I remember one vaccinated in December that lit up like that, and I am sure that it never came in contact with the virus the second time. It seems to be latent virus. There is not enough to cause successful vaccination, but when a little more is added, it makes all the places light up anew.

DR. LEWIS.—When I was in Washington, I availed myself of the opportunity to visit the National Vaccine Establishment. I was very much gratified with the condition of affairs. Everything is in first-class order, and precautions are all carried out.

DR. BURROUGHS.—In my business I have not used the tubes, but I am very favorably impressed with the reports. It seems to be more certain than the points, though I am satisfied with the points of the National Vaccine Company. I never heard of previous vaccination being set up a second time. These cases the Asheville gentlemen report are entirely new to me.

In regard to what Dr. Kent says, my impression is that he will get pure drinking water if he will filter it. If he will destroy all the fecal matter from the typhoid patients, he will greatly lessen the disease in his county. In every case you have, destroy all the excreta, and look after the water supply. Therein is the key to health, therein is protection. That is all of it in a nut shell.

DR. MINOR.—We all know that typhoid fever is endemic to many regions of the country. I think where the most trouble comes in is with the poor, uneducated classes. You ought to teach them first, if nothing else, that the well should be done away with. Where the well can not be done away with, you must teach them that it ought to have a sacred meaning, and have no close connection with the water-closet. You must teach them that the water-closet, or privy rather, must be water tight. Most of these privies have in them nothing but leaky tubs which are a constant source of contamination. The water supply, the well, and the privy are some of the things that must be looked after.

Impress upon them the necessity of keeping these places clean. Scare them, tell them they are liable to die at any minute if they don't look out.

Don't wait until typhoid fever comes into the house, but try to make them take care. Keep on, and after awhile you will see the barrels water-tight instead of open, and they will set to work and clean up around the wells and their premises generally.

DR. ALBERT ANDERSON.—To accomplish these results, we have been talking in Wilson about how to introduce water into our houses. Our medical society formulated plans and advised our Board of Aldermen to adopt them.

DR. W. S. ANDERSON.—It is simply this: We had the water and sewerage system introduced about two years ago, and up to the present time, only about 200 families use them. The plan was to leave the putting in of the fixtures to private enterprise. The result was that plumbers charged the people so much that they would not take the water. I thought they charged too much, and I sent and got a catalogue and price list and found my suspicions were true, that they were charging an enormous per cent. So we got our local society to

appoint a committee to investigate the sanitary conditions of our town, and that committee reported to the society that the water was doing no good at all as a sanitary measure.

We recommended that the town investigate as to the cost of the material, and that the town buy the material in large quantities in order to secure the cheapest rates, and put it in to the people at cost, and let the people pay cash for the material. They haven't decided yet what they will do, but we think they will get with this new Board that is just coming in, and that we will get the people of the town to do that, and in not a great while hence we will have the public water taken by all the people. Then there will be a large number of people who can not take it even at cost. We proposed to the town that they go forward and put it in to these people on credit and take their notes for it, because at the present water rent it would pay for itself in three years, if the poor fellow never pays it back. The town is not in the money-making business on the people of the town. We think that in that way we can get the full benefit for which the water supply was intended originally, and make it so cheap that all the people of the town will take it.

DR. LEWIS.—I think it would be well for the session to pass a resolution endorsing the Caffery Bill. I do not know what the sentiment is, but so far as I am concerned, and so far as anyone I have talked with is concerned, I think our opinion is that the National control of maritime quarantine had better be placed under the Marine Hospital Service, where the men are selected by competitive examination and not for political reasons, instead of under a National Department of Health, where the President appoints a Commissioner of Health with a salary of \$6,000, who has the power of appoint-

ing an assistant Commissioner. The practical difficulty with this plan in the first place is that politics would surely come into it, and the Commissioner of Health would be selected, not as an expert, but as a man politically desirable, who would probably, even if he should prove competent, have to give place to a new and inexperienced successor just about the time he had thoroughly learned the business.

The Caffery Bill, which was introduced by Senator Caffery, from Louisiana, and chiefly advocated by Senator Vest, from Missouri, is a bill that enlarges the powers of the Marine Hospital Service, and confides to them this National supervision.

DR. CARR.—I think if the Secretary would offer a resolution the Society would adopt it. We wish to carry out his wishes, for we know he is right.

DR. MINOR.—I realize fully that Dr. Lewis understands it, but I do not. I have seen lately in the press, and in the medical press, too, such conflicting opinions that it would seem to me until a full statement of both bills could be presented to us, we might be acting improperly in proceeding to recommend what we do not fully understand. I can not vote on a thing till I know more about it.

DR. LONG.—I do not think any of us can go wrong when we know that one bill proposes to put the control under competent scientific men. I think we must have some National legislation in regard to this. If we can get it and keep it under scientific control and get Uncle Sam's help, too, I am in favor of it, but if it is to be changed every four years, I am not, and we can not go wrong if we take a stand against it.

DR. LEWIS.—I would like to call attention to the fact that this bill is introduced by Senator Caffery, of Louisiana. The quarantine of New Orleans is superior to any

in America or anywhere, and notwithstanding that fact and that the Senator from Louisiana is a Democrat and a States' Rights man, he has introduced this bill. The most ardent advocate of the bill is Senator Vest, who yields to none in his jealous watch over the reserved rights of the States.

The following resolution was then adopted without a dissenting voice:

Resolved. That the North Carolina Board of Health and the Medical Society of the State of North Carolina in conjoint session assembled endorse the Caffery Bill, enlarging the powers of the United States Marine Hospital Service, and respectfully request our Senators and Representatives to support the same.

The session was then adjourned.

THE PUBLIC WATER SUPPLIES OF THE STATE.

At the annual meeting of the Board at Morehead in June, 1897. "it was ordered that the municipal water supplies of the State be examined chemically and bacteriologically during the current year: and that the Engineer of the Board be requested at his convenience to collect, pack and ship samples for the same, and at the same time to make an inspection and report on the various water works and watersheds." Colonel Shaffer having carried out the above instructions, submitted his report to the recent meeting of the Board in Charlotte—the first since the completion of the work—and the Secretary was ordered to publish it in the *Bulletin*.

It may be remembered by some of our readers that this work of systematically investigating all the public water supplies of the State was first undertaken in 1896, and was limited to simply an analysis of the water.

While that examination was very incomplete, owing to the extremely small appropriation by the State, it undoubtedly had a good effect on the water companies. We are all more particular if we know we are watched. Realizing this, the Board felt that some of its little money could not be put to a better use, and so the action indicated above was taken.

The reader will understand, of course, that we do not suppose that an annual inspection and analysis will make pure water, but it will make far purer water by causing the water companies themselves to take a more active interest in the matter. Neither would any number of analyses insure pure water, for the reason that it must be already infected before the pathogenic bacteria can be found. Frequent inspections of the watershed, however, and thorough filtration would be much more effective. It is far safer and easier to prevent disease germs from getting into the water than to get them out after they have taken possession. And inasmuch as a number of our supplies are taken from small streams whose restricted watersheds are inhabited, the danger of infection is much greater than where the origin of the supply is different. After a careful consideration of the matter, we have come to the conclusion that the best thing water companies obtaining their supply from such watersheds can do to insure the purity of their water, is to employ some reliable man whose sole duty it shall be to thoroughly patrol the watershed, going over it and visiting every residence thereon at least twice a week, and promptly reporting every case of fever or diarrhoeal disease, that it may be immediately investigated and such precautions taken as may be necessary. We are glad to say that this suggestion, made in a conversation with one of the owners, has already been adopted by the Charlotte Water Company. If this thor-

ough and continuous inspection should be supplemented by approved filtration, we believe that the danger of infection would be reduced to a practical minimum. It is apparent, we think, that it would be clearly to the interest of the water companies, for the occurrence of typhoid fever traceable to their water would reduce their receipts far more than carrying out the above suggestion for a number of years. Besides, the effect of such careful protection of the water against infection would give confidence to the people, and would be immediately and continuously beneficial to their business.

The reader of the report will doubtless be struck with the high price charged for water, especially to small consumers, which, of course, includes all the poorer classes. In several instances a minimum consumption amounting to \$12 per annum is required, which is practically prohibitory to the poor. While no doubt some of the companies find it a hard matter to "make buckle and tongue meet," this should not be. We have no control over the price charged, but we feel it our duty to say that high-priced water is not in the interest of public health. Pure water in abundance, at a price within the reach of all, is one of the most powerful agencies for promoting the health of any community. It is for this reason that we believe so strongly in municipal ownership. We can not expect those who have invested their money in such enterprises for the purpose of securing dividends to look at the matter from the eleemosynary point of view—they have a right both in law and equity to make such charges as will insure them a reasonable return on their investment. But when the water works are owned by the people as a whole, the object of the management will not be dividends but health, comfort, beauty, and safety from fire. The general tendency is toward municipal ownership,

and we trust that it will spread in North Carolina. It pays. Wilson owns its own works and sells water at ten cents per 1,000 gallons at a profit.

It should be noted in connection with the chemical analyses that where the albuminoid ammonia is too high, that it is nearly always due to vegetable matter in the stream in the form of leaves, etc., and that it is not dangerous in itself. In regard to the bacteriological tests, it should be said that while they are not as elaborate and complete as they might be, they are made by good men, and are carried far enough to show whether or not there is reason to suspect the water of being infected.

In conclusion, we wish to put ourselves on record as favoring the use of public water supplies as against the water of wells, *provided* the companies will conscientiously use every reasonable effort to insure the purity of their supplies. The water of the public supply may sometimes be dangerous, but that from wells in closely-built cities and towns with surface privies, and more especially cess-pools, is much more apt to be so.

The chemical analyses were all made for us without charge by the North Carolina Agricultural Experiment Station, and we desire to make our acknowledgments to Acting-Director Withers for his valuable aid in this respect.

The comments on all chemical analyses are made by the chemist.

REPORT OF COL. A. W. SHAFFER, ENGINEER OF THE
BOARD.

GOLDSBORO.

GOLDSBORO, August 3, 1897.

One sample taken from intake on Little River at the power house, and one from the tap in front of Hotel Kennon, on Railroad street,

both for bacteriological analysis, taken, packed and delivered to Dr. Anderson, of Wilson, in his presence. Samples for chemical analysis have been since procured by yourself.

This visit to Goldsboro has been fully reported heretofore.

The following is the report referred to:

"I reached the city about noon, and was glad to find awaiting me the President, Dr. George G. Thomas, and the Biologist, Dr. Anderson, Drs. Spicer and Hill conferring with us cordially.

"We visited the water works on Little River in company with the mayor, and found the works small, but filter working well, and supply tinted with the juniper and cypress through which it passes, but clear, and free from green scum, bad odor or taste, which had been reported to exist there. We took samples from the intake and returned to the city; took another from the tap in front of Dr. Hill's drug store, in the hotel building, and Dr. Anderson packed both in ice and carried them with him that night to Wilson.

"Through the courtesy of the mayor we were enabled to ride over the town and view its watershed and drainage. We found no sewers, but we never saw a town so well adapted by nature for efficient sewerage at a moderate expense—say Waring's system. There is ample grade and fall in every direction, with no rock or hard subsoil to penetrate, and would discharge into Neuse River within a mile of the corporate limits, two to three miles below the intake on Little River.

"The water bearing stratum of Goldsboro lies barely ten feet below the surface, and in wet seasons the water in the wells rises to within four to six feet of the surface. The waste water of the town empties into shallow surface ditches, and is liable to percolate through the sandy crust to the wells, from which a large majority of the citizens of Goldsboro obtain their water for all purposes.

"I think that so far as the health of the town is concerned, there is greater danger than with no water works, because of the lack of sewerage to carry off the waste.

"Briefly stated, Goldsboro is situated upon a plateau of open, sandy loam, elevated about twenty feet above, and distant about one mile from Little River on the northwest, and Neuse River on the south. The water bearing stratum under the town averages eight to twelve feet below the surface, and there are localities in which the well water can be reached from the surface with a long-handled gourd. Having no sewers, the city is drained by shallow surface ditches, alternately wet and dry from atmospheric causes; always more or less charged with the waste and sewage of buildings, and the use of the street and lawn taps connecting with the river supply, the shallow wells being the common receptacle and reservoir of all.

"If typhoid germs breed and multiply under these conditions,

then Goldsboro is an ideal propagating ground, though the waters at the intake be as pure and limpid as those of Pison, Gihon or Hiddekel, that sprang from the garden of God.

"Works belong to private parties, who sell water to small consumers at 40 cents per 1,000 meter gallons."

N. B.—Since the above report was made the people of Goldsboro have voted bonds for sewerage of the city.

CHEMICAL ANALYSIS.

Sample from Intake.

Total solid matter in solution.....	3.3	gr. per U. S. gal.
Hardness	1.4	deg. Clarke's sc.
Equiv. to cal. car	0.33	gr. per U. S. gal.
Chlorine	0.33	gr. per U. S. gal.
Free ammonia	0.106	parts per mil.
Album. ammonia	0.170	parts per mil.

The chemical analysis indicates that this is not a good water for drinking purposes.

Sample from Faucet in City.

Total solid matter in solution.....	3.3	gr. per U. S. gal.
Hardness	1.4	deg. Clarke's sc.
Equiv. to cal. car	3.3	gr. per U. S. gal.
Chlorine	0.33	gr. per U. S. gal.
Free ammonia	0.043	parts per mil.
Album. ammonia	0.232	parts per mil.

The chemical analysis indicates that this is not a good water for drinking purposes.

BACTERIOLOGICAL EXAMINATION BY DR. ANDERSON.

One sample, unfiltered, was collected from the intake at the river. This showed 300 bacteria to the C. C. of benign form. The other sample, filtered, was collected from a faucet on Railroad street, and this contained only 53 bacteria to the C. C. The last sample represents the water used by the city, which is good.

WILSON.

WILSON, November 8, 1897.

Two samples taken from tap in drug store adjoining Dr. Anderson on Main street—one delivered personally to Dr. Anderson and the other sent to Experiment Station at Raleigh.

Visited power-house, intake and watershed with Dr. Anderson. These are about a mile from town. The works have no filter and the town no sewerage. The intake is about one hundred yards from the works, on the run of Toisnot Swamp, with a flow of water over the dam 10 inches deep and 12 feet wide, clear, but full of floating leaves, and tinted slightly by decaying vegetation. The canal draining the swamp is about one thousand feet in length, and the area of the swamp about one and a half square miles, with ever recurring living springs along its margin—a very slight run crossing the road a mile above the intake. If an open, dry ditch could be maintained around the margin of the swamp, the banks of the canal and the run of the swamp cleared—say twelve feet wide on each side—and the run of the swamp opened and kept clear from dead leaves, falling branches, trunks of rotten trees and water-grasses that obstruct the flow, they would have as near an ideal reservoir as swamp lands ever afford.

The works are owned and operated by the town; sell water to small consumers at ten (10) cents per 1,000 meter gallons, and realize a profit upon the cost of plant and its operation.

CHEMICAL ANALYSIS.

Total solid matter in solution	3.33	gr. per U. S. gal.
Hardness	1.7	deg. Clarke's sc.
Equiv to cal. car	0.58	gr. per U. S. gal
Chlorine	0.33	gr. per U. S. gal.
Free ammonia	0.0449	parts per mil.
Album. ammonia	0.2155	parts per mil.

The high percentage of albuminoid ammonia indicates vegetable contamination.

BACTERIOLOGICAL EXAMINATION BY DR. ANDERSON.

The bacteriological examination of sample of water collected from the Wilson public water supply, November 10, 1897, showed 150 bacteria to the C. C. All tests used in making the examination showed the water good.

NEWBERN.

NEWBERN, November 10, 1897.

Took two samples water from the running public hydrant at the corner of Main street, near the Hotel Chattawka; one sent to Dr. Anderson at Wilson, the other to Experiment Station at Raleigh. Water derived from six bored, or artesian wells; no watershed or

filter. Works owned and operated by private corporation, and water sold to small consumers at 50 cents per 1,000 meter gallons, with a minimum of 100 gallons per day.

CHEMICAL ANALYSIS.

Total solid matter in solution.....	10.25	gr. per U. S. gal.
Hardness	10.01	deg. Clarke's sc.
Equiv. to cal. car.....	7.58	gr. per U. S. gal.
Chlorine	0.5	gr. per U. S. gal.
Free ammonia	0.0100	parts per mil.
Album. ammonia	0.020	parts per mil.

There is no indication of organic contamination.

BACTERIOLOGICAL EXAMINATION BY DR. ANDERSON.

The sample of water received from the Newbern public water supply, November 10, 1897, showed only 83 bacteria to the C. C. in making a bacteriological examination. All tests used show this water to be very good.

WILMINGTON.

WILMINGTON, November 11, 1897.

Took two samples water from tap in Mr. Munds's drug store on Main street; packed, addressed and deposited them in express office, and withdrew them after conference with and upon advice of the President of the Board to be retaken upon the completion of the artesian well now boring upon the site of the power-house, or other production of acceptable water.

Owing to the liability of infection by the city sewage in the ebb and flow of the tide, it is earnestly recommended that the intake be removed above tide water, in the event of the failure of the artesian well now boring.

The works are owned and operated by private parties, and the water is sold to small consumers at 20 cents per 1,000 meter gallons.

FAYETTEVILLE.

FAYETTEVILLE, November 12, 1897.

Two samples of water taken from the running public hydrant at the corner of Hotel Lafayette on Main street. One to Dr. W. T. Pate, at Gibson Station, and the other to the Experiment Station at Raleigh.

This water is derived from the great spring on Haymount Hill, and used for drinking purposes chiefly. Other water is taken from the run of Cross Creek, used for general purposes, and for drinking where Haymount water can not be obtained. No sample taken from Cross Creek water.

The works are owned and operated by private parties, and the water sold to small consumers at 25 cents per 1,000 meter gallons, but not less than \$1 per month.

CHEMICAL ANALYSIS.

Total solid matter in solution.....	2.83	gr. per U. S. gal.
Hardness	1.8	deg. Clarke's sc.
Equiv. to cal. car	0.67	gr. per U. S. gal.
Chlorine	0.5	gr. per U. S. gal.
Free ammonia	0.061	parts per mil.
Album. ammonia	0.0375	parts per mil.

The chemical examination shows no indication of organic contamination.

BACTERIOLOGICAL EXAMINATION BY DR. PATE.

The quantitative analysis gave 180 bacteria per cubic centimeter. The qualitative tests showed no suspicious organisms. Sample good.

ASHEVILLE.

ASHEVILLE, November 19, 1897.

Two samples taken from tap in Asheville hotel. One to Dr. Albert Anderson at Wilson; the other to the Experiment Station, Raleigh. Through courtesy of Dr. Fletcher, visited the filter within the city, the stand-pipe and reservoir on Beaucatcher Mountain, and the power-house and intake five miles out on the left bank of Swannanoa River. This is the best plant in the State. Four large filters are enclosed in brick walls; the reservoir is an abandoned rock quarry, cleaned out and cemented, safe against the intense cold that destroyed the stand-pipe a few years ago, and the power-house, dam and forebay are of solid rock masonry. The water is conducted to the city through two lines of pipes, one 10 and the other 16 inches in diameter, over two mountain spurs into the stand-pipe and the reservoir.

This most expensive of the municipal water works of the State is the property of the city of Asheville, selling its water to small consumers at 15 cents per 1,000 meter gallons, and supplying the street sprinkling, the sewer flushing, the public hydrants and the public fountains free.

The only settlement on this watershed is at Black Mountain, 16 miles away, and very small.

CHEMICAL ANALYSIS.

Total solid matter in solution.....	2.16	gr. per U. S. gal.
Hardness	1.4	deg. Clarke's sc.
Equiv. to cal. car.....	0.33	gr. per U. S. gal.
Chlorine	0.16	gr. per U. S. gal.
Free ammonia	0.013	parts per mil.
Album. ammonia	0.0325	parts per mil.

A very pure water.

BACTERIOLOGICAL EXAMINATION BY DR. ANDERSON.

The sample from the Asheville public water supply was received November 20, 1897. In the bacteriological analysis of this water no harmful bacteria were found.

 CHARLOTTE.

CHARLOTTE, November 22, 1897.

Took two samples water from the running tap at Van Ness's grocery on North Tryon Street. One to Dr. W. T. Pate, Gibson Station, the other to Experiment Station, Raleigh.

By courtesy of Dr. Brevard, joint owner with Mr. Eli Springs, I visited the power-houses, reservoirs and part of the watershed. The latter consists largely of cultivated land. Not a favorable watershed for first-class water without thorough filtration. There are, however, four filters in use. The supply is derived from two streams. Both average about one and a half miles from the principal square in town at the intersection of Trade and Tryon streets. Both are conducted to a settling basin near the power-house, from which the water is conveyed to the filters.

This plant is owned and operated by private parties, and water is sold to small consumers at 50 cents per 1,000 meter gallons. There exists an inchoate contract for the sale of the plant to the city.

NOTE.—The management proposes to reduce the rent to private consumers.

CHEMICAL ANALYSIS.

Total solid matter in solution.....	5.91	gr. per U. S. gal.
Hardness	3.8	deg. Clarke's sc.
Equiv. to cal. car.....	2.33	gr. per U. S. gal.
Chlorine	0.416	gr. per U. S. gal.
Free ammonia	0.36	parts per mil.
Album. ammonia	0.1877	parts per mil.

The chemical analysis indicates vegetable organic contamination.

BACTERIOLOGICAL EXAMINATION BY DR. PATE.

The quantitative examination gave 425 bacteria to the C. C. This sample forms gas in both glucose and lactose bouillon, but I did not succeed in isolating the fermenting bacteria.

SECOND BACTERIOLOGICAL EXAMINATION MADE FOR WATER COMPANY BY DR. PATE.

I have the honor to report as follows on sample of water sent me from the public water supply of Charlotte June 2, 1898:

Sample shipped without ice.

Is is clear; no sediment.

Contains only 120 bacteria to the C. C. of water. No fermentation in lactose or glucose bouillon, even after several days' growth.

This analysis indicates a safe drinking water.

CONCORD.

CONCORD, November 23, 1897.

Two samples of water taken from tap at Marsh's drug store in presence of Mayor Crowell—one to Dr. W. T. Pate at Gibson Station, the other to Experiment Station at Raleigh

Visited power-houses (two—both inside city) with Mayor Crowell. The city is built upon the crest of a long ridge, and the supply of one station is taken from the Reed Gold Mine shaft on one watershed, and the other from surface springs on the opposite side, both very exactly on the watershed of the town. At the first I found a pond of perhaps an eighth of an acre, about a hundred feet above the shaft, the overflow passing the station within ten or twelve feet. On the other watershed, directly opposite, was the other power-house, beside a walled and covered spring.

The power-house contained a small Worthington pumping engine, furnishing power to run the pump and the electric light plant of the town.

The Concord plant is owned and operated by a private party; has a stand-pipe, but no reservoir or filter, and the water is sold to small consumers at 50 cents per 1,000 meter gallons.

CHEMICAL ANALYSIS.

Total solid matter in solution	9.66	gr. per U. S. gal.
Hardness	6.1	deg. Clarke's sc.
Equiv. to cal. car	4.25	gr. per U. S. gal.
Chlorine	1.16	gr. per U. S. gal.
Free ammonia	0.0449	parts per mil.
Album. ammonia	0.05	parts per mil.

The chemical analysis does not show any indications of organic contamination.

BACTERIOLOGICAL EXAMINATION BY DR. PATE.

The quantitative examination gave 350 bacteria to the C. C. This water ferments both glucose and lactose at 42 degrees in 36 hours. Quantity of bacteria low—quality suspicious.

CONCORD.

SECOND INSPECTION.

CONCORD, May 5, 1898.

I have the honor to report that pursuant to the direction of the Board, made at Charlotte conference on the 4th inst., I visited Concord, N. C., and took new samples of the municipal water, one for the North Carolina Experiment Station, at Raleigh; the other for Dr. W. T. Pate, Biologist, Gibson, N. C., forwarding same to each on the 5th inst.

I also visited and carefully inspected the pump-houses and water-sheds of the two stations, from which the water is obtained, in company with Mayor Crowell and the owner, Mr. Fetzer.

I found the ground about the walled spring had been raised about the spring and graded off so as to make a watershed of about fifty (50) feet all around it, and the surface was clear and free from grass and weeds, but not inclosed. Some additional machinery, of an improved pattern—mostly electrical—had been placed in the power-house, but no closet or stables had been removed from the watershed. Mayor stated, however, that an ordinance removing them, to go into effect June 1, had been passed.

At the station on the opposite side of the ridge on which the town stands, known as the Reed Gold Mine Shaft Station, I found the pump and connecting pipes repaired and the pond freshly drawn off. Another dam had been constructed across the run of the spring about two hundred and fifty (250) feet above the shaft—covering an area of about three thousand feet—the overflow of which was carried by a side-hill ditch to a wooden box receptacle about fifty (50) feet from the power-house, to be utilized for street sprinkling, the sprinklers taking it direct from the box.

The watershed of this station is exactly as I found it in November last—barring the change of the pond. No closets or stables have been removed. All of the stables, and most of the closets discharge upon the surface, but others discharge in unwalled and uncemented pits and "old wells," the latter of which are presumed to connect

directly with the water-bearing strata within a radius of three hundred yards of the pumping stations.

Mayor Crowell is deeply interested in a plentiful supply of pure water and a limited sewerage within the financial capacity of the town. He afforded me every possible facility for inspection and stated that the town council had lately adopted an ordinance for the removal of the closets and stables from the watershed, and assured me that if not rescinded at a subsequent meeting, he would see that the pits and vaults, after cleaning, should be well limed before filling, but the measure had met strong opposition, and there was danger of a reconsideration and rescinding of the ordinance before it goes into effect on June 1, 1898. I saw and conversed with some of the members of the town council, and gathered from their remarks that while all wanted pure water and plenty of it, they were disinclined to credit the contamination theory, and feared a "job," by which oppressive taxes would be inflicted without corresponding benefits. The *wells* on the dividing ridge are about forty feet in depth. How they will cleanse and purify those used for closet vaults, or whether they will fill them up without cleaning, or continue their use as heretofore, is yet an unsolved problem. I regret to have to state that the situation at Concord is not greatly improved from the situation of my November report, and I doubt whether it will be greatly improved until the water supply is taken from a source above and beyond the town limits. The Mayor assured me that such a source existed about two miles out, with ample supply for many years of rapid annual increase.

CHEMICAL ANALYSIS.

Total solid matter in solution.....	9.58	gr. per U. S. gal.
Hardness	3.6	deg. Clarke's sc.
Equiv. to cal. car.....	2.16	gr. per U. S. gal.
Chlorine ...	0.79	gr. per U. S. gal.
Free ammonia	0.0073	parts per mil.
Album. ammonia	0.0175	parts per mil.

A very pure water.

BACTERIOLOGICAL EXAMINATION BY DR. PATE.

Sample of water collected May 5, 1898, by A. W. Shaffer, S. E., from tap at Johnson's drug store, Concord N. C. This sample contains only 92 bacteria to the C. C. of water. No fermentation in lactose or glucose bouillon in 48 hours.

This indicates fair drinking water, and is by far the best sample that we have had from this supply.

· SALISBURY.

SALISBURY, November 24, 1897.

Took two samples water from flowing hydrant of E. K. James, on Inniss street. One to Dr. Albert Anderson, at Wilson; the other to Experiment Station, Raleigh.

Water derived from Cane Creek, rising about six miles above town and flowing along the base of Dunn's Mountain, from which a large part of its water comes. Watershed, cleared land on one side and mountain growth on the other. No residential obstructions.

Power-house and intake two miles out; stand-pipe in town; no sewerage; pump run by Worthington engine; no filter; all in good condition. E. B. Neave, Superintendent.

Plant owned and operated by private parties, and water sold to small consumers at 30 cents per 1,000 meter gallons.

CHEMICAL ANALYSIS.

Total solid matter in solution	9.16	gr. per U. S. gal.
Hardness	3.8	deg. Clarke's sc.
Equiv. to cal. car.	2.33	gr. per U. S. gal.
Chlorine	1.66	gr. per U. S. gal.
Free ammonia	0.0566	parts per mil.
Album. ammonia	0.0725	parts per mil.

The chemical analysis does not give any indications of organic contamination.

BACTERIOLOGICAL EXAMINATION BY DR. ANDERSON.

In the bacteriological analysis of sample of water sent from Salisbury, received on the 26th of November, there were revealed some bacteria of a suspicious nature. There were 180 bacteria to the C. C.

GREENSBORO.

GREENSBORO, November 25, 1897.

Took two samples water from running tap at Holton's drug store, in Hotel McAdoo Building, on Main street. One sent to Dr. Albert Anderson, at Wilson; the other to the Experiment Station, Raleigh.

Thanksgiving Day; everybody gone a-birding; did not go to plant or watershed. Couldn't find anybody who knew anything about it.

Plant owned and operated by private parties, and water sold to the small consumers at 40 cents per 1,000 meter gallons.

CHEMICAL ANALYSIS.

Total solid matter in solution.....	5.66	gr. per U. S. gal.
Hardness	3.4	deg. Clarke's sc.
Equiv. to cal. car.....	2.0	gr. per U. S. gal.
Chlorine	0.25	gr. per U. S. gal.
Free ammonia	0.0126	parts per mil.
Album. ammonia	0.0737	parts per mil.

The chemical analysis does not give any indication of organic contamination.

BACTERIOLOGICAL EXAMINATION BY DR. ANDERSON.

On November 26 I received sample of water from the Greensboro public water supply. The bacteriological analysis showed 150 bacteria to the C. C. This water is good.

WINSTON.

WINSTON, November 26, 1897.

Took two samples from public hydrant in City Hall. One sent to Dr. W. T. Pate, Gibson Station; the other to Experiment Station, Raleigh.

Supply derived from two springs. No watershed; no filter and no sewerage.

Plant owned and operated by private parties and water sold to small consumers at 40 cents per 1,000 meter gallons. Rained all day. No ice accessible.

CHEMICAL ANALYSIS.

Total solid matter in solution.....	4.08	gr. per U. S. gal.
Hardness	2.1	deg. Clarke's sc.
Equiv. to cal. car.....	0.91	gr. per U. S. gal.
Chlorine	0.766	gr. per U. S. gal.
Free ammonia	0.0233	parts per mil.
Album. ammonia	0.0435	parts per mil.

The chemical analysis gives no indication of contamination.

BACTERIOLOGICAL EXAMINATION BY DR. PATE.

Shipped without ice. The quantitative examination gave 880 bacteria to the C. C.

The qualitative examination reveals no suspicious bacteria.

SALEM.

SALEM, November 26, 1897.

Took two samples water from tap at Dr. Shaffner's drug store, on Main street. One for Dr. W. T. Pate, at Gibson; the other to Experiment Station, Raleigh.

Water supply derived from springs in southwest part of town.

No watershed, no filters and no sewerage.

Plant owned and operated by private parties, and water sold to the small consumers at 50 cents per 1,000 meter gallons. Rained all day.

No ice accessible for bacteriological specimen.

CHEMICAL ANALYSIS.

Total solid matter in solution.....	5.08	gr. per U. S. gal.
Hardness	1.9	deg. Clarke's sc.
Equiv. to cal. car.....	0.78	gr. per U. S. gal.
Chlorine	1.25	gr. per U. S. gal.
Free ammonia	0.24	parts per mil.
Album. ammonia	0.1935	parts per mil.

The chemical analysis indicates that this water is very dangerous. There seems to be contamination from sewage.

BACTERIOLOGICAL EXAMINATION BY DR. PATE.

The quantitative examination gave 1,360 bacteria per C. C. This sample was sent by express without ice.

The qualitative examination gave no indication of the presence of suspicious organism.

As soon as the attention of the management of the Salem Water Company was called to the report of the State Chemist on their water, they expressed their inability to explain the apparent condition of the water, and at once asked that four new analyses, representing the four sources of supply, be made. This was done, but all four samples turned out chemically excellent water. The apparent contamination of the first sample has never been explained. The following are the supplementary analyses:

Total solid matter in solution.....	2.92	gr. per U. S. gal.
Hardness	2.5	deg. Clarke's sc.
Equiv. to cal. car.....	1.25	gr. per U. S. gal.
Chlorine	0.46	gr. per U. S. gal.
Free ammonia	0.051	parts per mil.
Album. ammonia	0.050	parts per mil.

This sample shows no indication of organic contamination.

Total solid matter in solution.....	3.25	gr. per U. S. gal.
Hardness	3.3	deg. Clarke's sc.
Equiv. to cal. car.....	1.92	gr. per U. S. gal.
Chlorine	0.67	gr. per U. S. gal.
Free ammonia	0.0316	parts per mil.
Album. ammonia	0.0500	parts per mil.

This sample shows no indication of organic contamination.

Total solid matter in solution.....	3.17	gr. per U. S. gal.
Hardness	2.3	deg. Clarke's sc.
Equiv. to cal. car.....	1.08	gr. per U. S. gal.
Chlorine	0.25	gr. per U. S. gal.
Free ammonia	0.0500	parts per mil.
Album. ammonia	0.0487	parts per mil.

This sample shows no indication of organic contamination.

Total solid matter in solution.....	1.17	gr. per U. S. gal.
Hardness	1.8	deg. Clarke's sc.
Equiv. to cal. car.....	0.67	gr. per U. S. gal.
Chlorine	0.208	gr. per U. S. gal.
Free ammonia	0.044	parts per mil.
Album. ammonia	0.0312	parts per mil.

This sample shows no evidence of organic contamination.

DURHAM.

DURHAM, December 2, 1897.

Took two samples water from flowing public hydrant, corner Cochrane and Main streets. One to Dr. Albert Anderson, Wilson; the other to Experiment Station, Raleigh.

Water supply taken from a stream nine miles out, at its junction with Eno River. Reservoir five miles out. Filter and sewerage here. Did not visit watershed, as it would consume another day.

Works owned and operated by private parties, who sell water to small consumers at 25 cents per 1,000 meter gallons, or \$3 per quarter, with privilege of 12,000 gallons.

CHEMICAL ANALYSIS.

Total solid matter in solution.....	3.67	gr. per U. S. gal.
Hardness	1.9	deg. Clarke's sc.
Equiv. to cal. car.....	0.75	gr. per U. S. gal.
Chlorine	0.275	gr. per U. S. gal.
Free ammonia	0.173	parts per mil.
Album. ammonia	0.0505	parts per mil.

While the chemical analysis will not condemn this water, it places it under suspicion of being contaminated with organic matter.

BACTERIOLOGICAL EXAMINATION BY DR. ANDERSON.

There were 316 bacteria to the C. C. found in sample of water from Durham public water supply, received and put in culture December 3, 1897. The water is fairly good.

HENDERSON.

HENDERSON, December 3, 1897.

Took two samples water from running public hydrant on public square. One sent to Dr. W. T. Pate, Gibson Station; the other to Experiment Station, Raleigh.

Water taken from wells; no watershed, no filter, and no sewerage.

Plant owned and operated by private parties, and water sold to small consumers at 40 cents per 1,000 gallons meter measure.

CHEMICAL ANALYSIS.

Total solid matter in solution.....	3.25	gr. per U. S. gal.
Hardness	1.5	deg. Clarke's sc.
Equiv. to cal. car.....	0.42	gr. per U. S. gal.
Chlorine	0.25	gr. per U. S. gal.
Free ammonia	0.067	parts per mil.
Album. ammonia	0.02037	parts per mil.

BACTERIOLOGICAL EXAMINATION BY DR. PATE.

The quantitative examination gave 184 bacteria per C. C. The qualitative tests indicate safe drinking water.

RALEIGH.

RALEIGH, December 7, 1897.

Two samples water taken from running public hydrant in front of Metropolitan Hall on Fayetteville street. One to Dr. Albert Anderson, at Wilson; the other delivered in person to Experiment Station, Raleigh.

Water supply taken from Walnut Creek, one mile south of city. Intake a mile above, and a fourth of a mile above Rhamkatté road. Stream rises at Cary, eight miles west of city. Watershed visited, inspected and fully reported on heretofore. Condemned Yates dam still dominates the waters. The company filter their water, and the city is sewerred.

Plant owned and operated by private parties who sell water to the small consumers at 40 cents per 1,000 meter gallons, conditioned that it amount to \$12 per annum, or 30,000 gallons per annum.

DETAILED REPORT ON WATERSHED.

"I have the honor to report upon the watershed of the Raleigh Water Company. visited and inspected in company with Dr. James McKee, Superintendent of Health of the city; W. M. Russ, Mayor; and Alexander M. McPheeters on the part of the company, on the 24th inst. Commencing at Cary, we found two open, unboxed privies on the bank of the main ditch, and a pig-pen on another. the contents of the latter flowing directly into the main ditch at a distance of about two hundred feet.

"The main ditch contained a very slight run of water, the product of a heavy shower the previous night. There is no living tributary at Cary, the ditch carrying no water except surface water during, and a few hours after, a storm—twenty-four hours after which it is as "dry" as the town ordinance. The first evidence of a living stream appears about a mile below the town.

"We found all the streams running muddy water from the rains of the previous night, until we reached the Hugh Campbell Spring Branch, a bold, crystal stream flowing from two fine springs on the place.

"The watershed from Cary to Raleigh is largely covered and protected by a natural growth of forest and hedge, briars, cane and shrub, and we found little to criticise until we reached the "Little Yates Mill." of L. D. Castleberry, on the Avent Ferry road in Swift Creek Township. The dam of this mill backs water over five to six acres, filled with mud and decomposed vegetation, with a rank growth of grass, reeds, shrubs and weeds. As the water is very shallow and the mud very deep the site can be of no considerable value for mill purposes, and afforded no evidence of late use. Such a deposit in the main run of the water supply must of necessity contaminate the water that flows from that point, creating a nuisance that ought to be abated if possible.

"I am informed by Dr. McKee that this dam was reported detrimental to the health of the people of Raleigh and declared to be a nuisance in December, 1895. I have since found such report and declaration, bearing date December 21, 1895. and signed by him officially as Superintendent of Health of the city of Raleigh, and the signature of Dr. P. E. Hines, preceded by the following: *'I endorse the above recommendation.'*

"The intake of the company is situated upon the Grimes farm above the bridge on the Rhamkatte road, about a mile southwest of the corporate limits of the city. The surplus water flows over a

natural ledge of gneissoid granite brought to a dead level so as to carry off all floating foreign matter at every point, *always provided* it first escape the wide mouth of the intake, set in the current and facing up stream, like a saurian bobbing for flies. A proper adjustment of this intake would greatly relieve the filter at the pump-house and remove an ever-present source of adverse criticism."

CHEMICAL ANALYSIS.

Total solid matter in solution.....	4.58	gr. per U. S. gal.
Hardness	2.1	deg. Clarke's sc.
Equiv. to cal. car.....	0.92	gr. per U. S. gal.
Chlorine	0.30	gr. per U. S. gal.
Free ammonia	0.031	parts per mil.
Album. ammonia	0.0787	parts per mil.

The chemical analysis shows no indication of contamination from organic matter.

BACTERIOLOGICAL EXAMINATION BY DR. ANDERSON.

I found 240 bacteria to the C. C. in sample from the Raleigh public water supply, some of which were of a suspicious nature.'

The order of the State Board of Health is executed.

All which is respectfully submitted,

A. W. SHAFFER, S. E.

As showing the spirit in which the efforts of the Board to secure purer water for the people were met by the municipal authorities, we take pleasure in printing the following from the Mayors of Charlotte and Concord, respectively.

We are also glad to say that the water companies seemed disposed to do what they could to insure pure water to their patrons. But we should add in this connection that there is apt to be a difference of opinion as to "what they could" might mean, and that consequently, as pure water is a vital matter, the precautions, etc., to be taken by operators of public water supplies, should be defined with reasonable exactness by law. In view of this we prepared and had introduced in the last General Assembly the appended bill. It met with favor

from the Committee on Public Health, and all others to whose attention it was called, but owing to the multitude of other bills of more interest to the Members, it could never be gotten before the House.

CHARLOTTE, N. C., February 10, 1898.

Dr. Rich'd H. Lewis, Raleigh, N. C.

DEAR SIR:—Your letter in regard to the condition of our city water received and noted. Your instructions are being carried out, and I also will have the watershed patrolled. Dr. Brevard, who is President of the Water Company, will be in Raleigh on the 22d of this month, and will call on you in regard to this matter. Any advice you can give him in regard to the permanent improvements of this plant we will be glad to carry out.

Yours very truly,

E. B. SPRINGS, *Mayor.*

CONCORD, N. C., February 12, 1898.

Dr. Richard H. Lewis, Raleigh, N. C.

DEAR DOCTOR:—Your favor of 3d instant received, inclosing the chemical and bacteriological analyses of our city drinking water, and I thank you for the suggestions made about the necessity of keeping the watersheds as clear as practicable. I assure you I am exerting myself to keep the watershed free from filth. But when you remember that the watersheds of our two water supplies are dotted thickly over with residences, etc., you will see how hard it is to keep it clean and free from filth pollution. There is one thing I desire your opinion on—that is “dry wells,” so called, into which sewerage from water-closets empty. It is reported that there are three or four on the watersheds here. I am preparing an ordinance to abolish them, and shall ask the Board of Aldermen at our next meeting to pass it. I desire, therefore, that you give me your opinion on these “dry-wells” or cess-pools, so I can have it before the Board who, by the advice you may give, can vote intelligently on the proposed ordinance.

I will thank you for your opinion about this matter as early as practicable. I am convinced that these wells or pools should not be tolerated, and if you agree with me I feel sure our Board will pass the ordinance.

Mr. Fetzner, the Manager of the Waterworks Company, is having the spring—one of the sources of water supply—drained and improved.

The report of your Engineer—about literally landing in human excrement—Mr. Fetzner thinks might be misunderstood. He says some thoughtless person had made this deposit—only one—near the well, and that was all of it.

I will thank you for suggestions at any time, and pledge you my prompt efforts in carrying them out.

Yours very truly,

J. S. CROWELL,

Mayor of Concord.

Answer, February 14, 1898: Cess-pools absolutely condemned. Change of water supply suggested. Begged to do all in his power to get his people vaccinated.

This very important matter will be brought again to the attention of our law-makers in the hope that it may meet with favorable action at their hands:

AN ACT TO PROTECT PUBLIC WATER SUPPLIES.

The General Assembly of North Carolina do enact:

Section 1. In the interest of the public health, every person or company selling water to the public for drinking and household purposes, shall take every reasonable precaution to protect from contamination and assure the healthfulness of such water; and any provisions in any charters heretofore granted to such persons or companies in conflict with the provisions of this act are hereby repealed.

Sec. 2. Those water companies deriving their supply from lakes or ponds, or from small streams not more than fifteen miles in length, shall have made a sanitary inspection of the entire watershed, not less under any circumstances than once in every three calendar months, and a sanitary inspection of any particular locality on said watershed at least once in each calendar month, whenever, in the opinion of the Board of Health of the city or town to which the water is supplied, or when there is no such local Board of Health, in the opinion of the County Superintendent of Health, or in the opinion of the State Board of Health, there is reason to apprehend the infection of the water by that particular locality. Said companies shall have made a sanitary inspection of any particular locality on said watershed at least once in each week, whenever, in the opinion of the Board of Health of the city or town to which the water is supplied, or when there is no such local Board of Health, in the opinion of the County Superintendent of Health, or in the

opinion of the State Board of Health, there is special reason to apprehend the infection of the water from that particular locality by the germs of typhoid fever or cholera.

The inspection of the entire watershed as herein provided for shall include a particular examination of the premises of every inhabited house on the watershed, and in passing from house to house a general inspection for dead bodies of animals or accumulations of filth. It is not intended that the term "entire watershed" shall include uninhabited fields and wooded tracts that are free from suspicion.

The inspection shall be made by an employee of, and at the expense of said water company, in accordance with reasonable instructions as to method to be furnished by the secretary of the State Board of Health.

The said sanitary inspector shall give in person to the head of each household on said watershed, or in his absence to some member of said household, the necessary directions for the proper sanitary care of his premises. It shall further be the duty of said inspector to deliver to each family residing on the watershed such literature on pertinent sanitary subjects as may be supplied him by the municipal health officer, or by the Secretary of the State Board of Health.

Sec. 3. In case of those companies obtaining their supply of water from rivers or large creeks, having a minimum daily flow of ten million gallons, the provisions of section 2 shall be applied to the fifteen miles of watershed draining into the said river or creek next above the intake of the water works.

Sec. 4. Failure on the part of any water company to comply with the requirements of sections 2 and 3 shall be punished by a deduction from any charges for water against the city or town supplied of twenty-five dollars for each and every such failure: *Provided*, That in no one year shall the sum of such forfeitures exceed five hundred dollars.

Where the water works are owned and operated by the city or town, failure on the part of the municipal official having in charge the management of the water works to comply as above, shall be a misdemeanor, and punishable by a fine of not less than ten nor more than twenty-five dollars, or by imprisonment for not less than ten nor more than thirty days: *Provided*, The said official do not prove to the satisfaction of the court that in spite of reasonable effort and diligence on his part he was prevented, directly or indirectly, by his superiors from doing his duty in this respect, in which case said superior officer or officers shall be deemed guilty of a misdemeanor, and punishable by a fine of not less than fifty nor more than two hundred dollars, or by imprisonment for not less than one nor more than six months.

Sec. 5. Every city or town having a public water supply shall, at its own expense, have made at least once in every three months by one of its own officials a sanitary inspection of the entire watershed of its water supply, and it shall be the duty of the said official making such inspection to report to the Mayor any violation of this act.

Sec. 6. Every person residing or owning property on the watershed of a lake, pond or stream from which a public supply is obtained, shall carry out such reasonable instructions as may be furnished him in the manner set forth in section 2, or directly by the municipal health officer or by the State Board of Health. Failure to do so shall be deemed a misdemeanor, and shall be punishable by a fine of not less than two dollars and costs, nor more than twenty-five dollars and costs, or by imprisonment for not less than ten nor more than thirty days.

Sec. 7. The charters of all cities and towns having public water supplies are hereby amended so as to give said cities and towns the same police powers on the watersheds of said public water supplies as they now possess within their corporate limits: *Provided*, These police powers shall apply only to violations of this act.

Sec. 8. The Mayor of each city or town having a public water supply shall have jurisdiction of all violations of this act, and the same shall be reported by the inspector of the city or town and of the water company to and tried by him, except where the water works are owned and operated by the city or town, in which case the matter shall be tried by some other justice of the peace or by the superior court, according as the penalty imposed fixes the jurisdiction. upon complaint of the municipal health officer, the County Superintendent of Health, the Secretary of the State Board of Health, or any resident of said city or town.

Sec. 9. Every water company, whether owned by private individuals or corporations, or by the municipality, shall have made, not less frequently than once in every three months, at its own expense, both a chemical and a bacteriological examination of a sample of its water drawn from a faucet used for drinking purposes, packed and shipped in accordance with the instructions to be furnished by the Secretary of the State Board of Health, and shall transmit a copy of the same to the Mayor, the municipal health officer and the Secretary of the State Board of Health.

Sec. 10. As a check and a guarantee of the faithful performance of the requirements laid down in the preceding sections of this act, the State Board of Health shall make or have made by its authorized agents such inspections of the watersheds and such chemical and bacteriological examinations of the public water supplies of the State as may be deemed necessary to insure their purity.

Should such inspections or examinations show conditions danger-

ous to the public health, the Secretary of the said State Board of Health shall notify the Mayor, the municipal health officer and the Superintendent or Manager of the water works at fault, and demand the immediate removal of said dangerous conditions. If at the end of thirty days after the service of said notice and demand, the said dangerous conditions have not been removed, to the extent that due diligence could accomplish such removal, the said Secretary shall have printed in one or more of the local newspapers a plain statement of the facts for the information and protection of the citizens using the water.

Sec. 11. Each sanitary inspector herein provided for is hereby authorized and empowered to enter upon any premises and into any building upon his respective watershed for the purpose of making the inspections herein required.

Sec. 12. For carrying out the provisions of this act, five hundred dollars, or so much thereof as may be necessary, are hereby annually appropriated to be paid on requisition to be signed by the Secretary and President of the State Board of Health. A yearly statement shall be made to the State Treasurer of all money received and expended in pursuance of this act.

Sec. 13. That this act shall be in force from and after May 1, 1897.

The following statement of the reasons for the passage of the bill was sent to each Member of the Legislature:

"BRIEF."

AN ACT TO PROTECT PUBLIC WATER SUPPLIES. REASONS WHY IT SHOULD BE PASSED BY THE GENERAL ASSEMBLY.

Of all the preventable diseases, consumption alone excepted, typhoid fever is by far the most deadly in our State. In the year 1896 there occurred in eleven cities and towns of the State, having an aggregate population of 105,501, which certified to the accuracy of their mortuary statistics, 107 deaths from typhoid fever—or one in every 967 of the population. Estimating at this ratio for the whole State on a basis of 1,800,000 population, the number of deaths from typhoid fever in North Carolina during the past year was 1,861. Taking the death rate given by one of the highest authorities in a similar calculation, 10 per cent, there were, during the same time, 16,749 persons sick of the disease who recovered. Let us see what this meant to the State in dollars and cents, leaving out of consideration entirely the anxiety and sorrow entailed. Valuing each life at

\$2,000, time lost by those who recovered on an average of 45 days of sickness per case at 80 cents per day, nursing, medicines and doctors' bills at \$25, and funeral expenses of those who died at \$25 each, the statement of the matter in tabular form is as follows:

1,861 deaths at \$2,000 each.....	\$3,722,000
1,861 funerals at \$25 each.....	46,525
Wages of 16,749 convalescents, during 45 days, at 80 cents..	602,964
Nursing, medicines and doctors' bills for 18,610 cases, at \$25 each	465,250

Total tax levied in 1896 by typhoid fever upon the State \$4,836,739

Deducting $33\frac{1}{3}$ per cent for every possible inaccuracy or over-estimate, typhoid fever cost the State last year in round numbers. \$3,000,000. And the pity of it is that so many lives and so much money could have been saved by proper precautions. The reader, interested in this phase of the subject, is referred to the accompanying article entitled "Does Pure Water Pay?" by Prof. Mason, the author of the best work on Water Supplies in the English language.

Typhoid fever is a preventable disease. It is caused almost invariably by drinking water which has been contaminated with the bowel discharges of another case. It is all important, therefore, to prevent this contamination, for while something can be done by filtration, it is not reliable as far as disease germs are concerned, and if well done is expensive. To prevent the entrance of the germs into the water in the first instance is the object of this bill, and it is for the direct benefit of the 125,000 (and more in the future) of our people living in fourteen of our largest and most progressive cities and towns. One case of typhoid fever or cholera on a watershed with out proper sanitary oversight would be liable to poison the whole city, or at any rate all of the inhabitants who use the public water supply—to spread sickness and death *wholesale*. Most of the water supplies in the State are from small, short streams whose watersheds are thickly populated, and therefore peculiarly dangerous.

It is the duty of the State to protect the lives of its citizens. Water companies are corporations organized for the purpose of making money. Their object is to declare dividends. A tender regard for the lives and health of individuals does not characterize them any more than other corporations. It is a proverb that corporations are soulless. The recent experience of the writer in investigating the water supplies of the State, under the instructions of the Board of Health, demonstrated the crying need of legislation as is embodied in the the Hon. Mr. Sutton's bill. While the above is true, corporations providing conveniences for the public should not be unreasonably hampered. This bill does not impose any hard conditions

upon them. Quite the contrary. An annual expenditure on their part of three or four hundred dollars would be required, but they would be more than reimbursed by the larger consumption which would result from the greater confidence in the purity and safety of the water that the presence of this law on the statute books would give. It would remove the suspicion and distrust that now exists—and with reason—in the minds of many. Seriously, the bill could be justly entitled “An Act to Promote the Business Interests of Water Companies.” In a word, its passage would materially promote the public health, and not only not injure, but positively benefit the water companies.

The extension of the police powers of the cities and towns to their watersheds, for the purpose of carrying out the provisions of this act alone, is extremely important, because it would provide what is now lacking, the practical machinery which would insure protection.

The necessity for general supervision by the State Board of Health, a disinterested body composed of men from all parts of the State, and uninfluenced by local considerations, whose business is to look after just such matters, is manifest. The small appropriation is absolutely necessary for the proper exercise of this supervision. Bacteriological examinations, which are much more important than chemical, although the latter are important also, are expensive, and the cost of inspections when indicated must met.

The General Assembly could hardly enact a law so fraught with good to the people and so free from objections of any kind.

RICHARD H. LEWIS, M. D.,

Secretary State Board of Health.

N. B.—Since the above was written three water companies, namely, Raleigh, Henderson and Durham (the only ones heard from), have expressed their approval of the bill and their desire for its passage.

OTHER WATER SUPPLIES.

STATE HOSPITAL AT MORGANTON.

Owing to an outbreak of typhoid fever among the inmates, limited in extent it proved to be fortunately, Dr. Murphy, the Superintendent, called upon the Board to investigate the matter. As the first step an examination, both chemical and bacteriological, of the two water supplies of the institution, the driven wells, No. 1, the supply from the mountain, No. 2, and the gathered ice, No. 3, was made. Chemically (see Nos. 10666, 10667 and 10668 in the tabulated chemical analyses following) the first two were good, the last unsafe, there being too high a percentage of ammonia, both free and albuminoid. Bacteriologically they were all good, as the following report from Dr. Anderson shows:

WILSON. N. C., July 23, 1898.

Dr. P. L. Murphy, Supt. State Hospital, Morganton, N. C.

DEAR DOCTOR:—In the examination of the three samples of water sent me July 19, I find only bacteria of benign form. There were 108 bacteria to the C. C. in No. 1; 165 bacteria to the C. C. in No. 2. In No. 3 there was an evident contamination of one Petri dish, as it contained so many bacteria and the others so few. The No. 3 sample contained very few bacteria to the C. C., excluding the dish referred to. The water from all the samples is good according to my bacteriological findings.

Truly yours,

ALBERT ANDERSON.

Upon further investigation in person by a committee from the Board, the origin of the disease was traced to the milk supply. See report on sanitary condition of State Institutions.

WILLARD MANUFACTURING COMPANY, WILLARDSVILLE,
NORTH CAROLINA.

Typhoid fever becoming prevalent among the operatives of these mills, Capt. S. A. Ashe having them in charge, sought the aid of the Board. The drinking water was obtained from two wells. The chemical analyses, Nos. 10441 and 10442, showed one to be unsafe and the other good. The bacteriological analyses given below showed both infected with intestinal bacilli, one slightly.

WILSON, N. C., July 18, 1898.

Mr. S. A. Ashe, Raleigh, N. C.

DEAR SIR:—A bacteriological analysis of the two samples of drinking water which you sent me on the 13th inst., shows two hundred and six colonies of bacteria to the C. C. in sample from the store well and one hundred and one colonies in sample from the the Helsenback well. The one from the store well was largely infected with intestinal bacilli; the other slightly so. I grew cultures from these samples in an incubator at temperature from 36 to 38½ degrees C. The culture of store well sample gave a decided fecal odor. The growth on potato was rapid and luxuriant, which is characteristic of this germ. Intestinal bacilli produce an acid in their growth, and this was shown both in cultures of lactose litmus agar and glucose bouillon in fermentation tube. The colonies on the blue agar medium were red from the action of the acid on the litmus. This germ in any medium containing glucose produces active fermentation liberating carbonic acid. In the fermentation tube this gas collected rapidly at the top of the closed arm of this tube. As the typhoid and this bacillus are frequently associated these wells should be discontinued.

ALBERT ANDERSON.

NORTH WILKESBORO.

In response to a request from Dr. Turner, Superintendent of Health of Wilkes County, for help in ferreting out the cause of several cases of typhoid fever in North Wilkesboro, permits for both chemical and bacteriological analyses were promptly sent him. For some reason the samples were not sent to the Experiment Station for the former, but two samples were examined biologically by Dr. Pate, who reported as follows:

GIBSON, N. C., September 12, 1898.

Dr. R. H. Lewis, Secretary, Raleigh, N. C.

SIR:—I have the honor to report as follows on two samples of water collected by Dr. J. M. Turner, Superintendent of Health, Wilkesboro, N. C., August 26, 1898:

Sample No. 1, from Columbus Upchurch's well, contains two hundred and five bacteria to the C. C., mostly intestinal bacilli, and is unfit for drinking purposes.

Sample No. 2, from Mrs. Wiles's well, contains one hundred and seventy-six bacteria to the C. C., none of which are of a suspicious character.

Yours very truly,

W. T. PATE.

From this it appears more than probable that the origin of the disease was in the infected water of Mr. Upchurch's well, which was badly contaminated with human excrement—emphasizing then for the thousandth time the prime necessity, by proper location and care of privies, of preventing such contamination.

CHEMICAL ANALYSES OF DRINKING WATERS.

During the past biennial period an unusually large number of analyses have been made for our Board free of charge by the State Experiment Station, and we acknowledge our indebtedness to Acting-Director Withers and State Chemist Blair for their kindness in this matter.

We give below in tabulated form the results of these analyses. The remarks are ours:

No.	Name and Address.	Location.	Total Solids.	Hardness.	Calcium Carbonate.	Chlorine.	Ammonia, Free.	Ammonia, Albuminoid.	Remarks.
10092	E. L. Cox, Jacksonville	Bored well	29.58	11.90	9.08	0.75	.334	.112	Chemically suspicious.
10093	E. L. Cox, Jacksonville	Spring	10.01	6.20	4.33	0.92	.040	.076	Very good.
10278	Wm. L. Kure, Wilmington	Not given	4.50	1.20	0.17	0.75	.032	.046	Very good.
10409	Durham Ice Company, Durham	Distilled water	1.30	1.00		0.30	.133	.160	Dangerous.
10410	Durham Ice Company, Durham	Well water	28.00	11.00	8.30	4.50	.160	.038	Suspicious
10411	W. S. Pharr, Charlotte	Well	21.08	6.90	4.90	3.90	.026	.109	Fair.
10412	Dr. R. D. Ross, Morven	Well water, No. 1	7.40	2.20	3.00	1.70	.016	.029	Unusually pure.
10413	Dr. R. D. Ross, Morven	Hardison's well	7.20	2.50	1.20	0.30	.003	.012	Unusually pure.
10414	Dr. R. D. Ross, Morven	M. H. Lowry's well	7.30	2.50	1.20	0.16	.007	.007	Excellent.
10415	Dr. R. D. Ross, Morven	Well water, No. 4	3.50	2.20	1.00	0.33	.016	.036	Very pure.
10422	B. Cole, Sanford	Well	26.70	11.10	8.40	9.70	.003	.015	Very good, but hard.
10423	C. O. Alexander, Elk Shoals.	Well 2 1/2 miles south	5.60	3.60	2.10	0.41	.047	.072	Good.
10424	K. L. Craven, Concord.	Well	13.90	5.20	3.50	1.90	.042	.024	Excellent.
10425	Clayton Giles, Wilmington	Yard water	12.40	2.50	1.20	5.60	.026	.044	Excellent.
10426	Clayton Giles, Wilmington	Grove water	121.7	3.70	2.2	71.2	.023	.052	Very good. Excessive amount of chlorine due to salt.
10427	N. W. West, Raleigh.	Not given	8.70	2.00	0.80	2.60	.029	.170	Suspicious.
10428	Dr. James McKee, Raleigh.	Well, East Martin street	8.80	2.60	1.30	2.50	.087	.035	Very fair.
10429	Mrs. W. H. Watkins, Sanford	Not given	33.20	7.80	5.6	12.50	.221	.200	Dangerous.
10434	W. E. Manning, Spring Hope	Not given	4.40				.016	.216	Unsafe.
10435	Roanoke Mills Company, Roanoke Rapids.	Deep drilled well	10.10	4.20	2.70	4.2	.050	.032	Very good.
10436	Dr. J. M. Hadley, LaGrange.	Not given	4.20	1.8	0.70	0.42	.050	.020	Very pure.
10441	Willard Manufacturing Company, Willardville.	Well	10.00	4.4	2.8	2.0	.033	.212	Unsafe
10442	Willard Manufacturing Company, Willardville.	Not given	10.7	3.4	2.0	1.8	.020	.042	Very good.
10443	N. C. Experiment Station, Raleigh.	Well in Capitol Square	11.0	3.45	2.05	1.40	.016	.049	Very good.
10446	Garret & Co., Chockoyotte.	Spring	not given.	10.30	7.75	.53	.053	.125	Slightly suspicious.
10447	Garrett & Co., Chockoyotte.	Well.	not given.	31.80	24.83	.792	.439	1.449	Very bad.
10450	Durham Water Company, Durham	Public supply.	3.66	2.20	1.00	.208	.048	.070	Good.
10451	B. P. Davis, Creek	Spring near town	8.66	5.30	3.30	.330	.991	.184	Dangerous.
10452	Westbrook & Wright, Wilmington	Spring on turnpike road	9.33	10.20	7.70	.50	.100	.170	Unsafe.
10453	Westbrook & Wright, Wilmington	Spring on Snakeville place	5.08	3.3	1.92	.958	.075	.043	Good.

No.	Name and Address.	Location.	Total Solids.	Hardness.	Calcium Carbonate.	Chlorine.	Ammonia Free.	Ammonia Albuminoid.	Remarks.
10557	Joel Reed, Concord	Spring	14.25	6.00	4.17	2.17	.589	.457	Unsafe.
10558	Mrs. E. M. Bledsoe, Raleigh	Spring	4.66	2.2	1.0	.25	.006	.145	Suspicious.
10581	L. W. Burroughs, Dabney	Well	5.08	2.00	.83	1.00	.106	.316	Unsafe.
10582	S. B. Bundy, Monroe	Artesian well	12.75	6.00	4.16	.58	.000	.032	Excellent; slightly h'd
10583	Henry E. Knox, Jr., Charlotte	Driven well in Reidsville	5.00	2.80	1.5	.16	.003	.007	Remarkably pure.
10597	Municipal Water Works, Asheville	Municipal Water Works	2.16	1.40	.33	.07	.017	.032	Very pure.
10598	State Board of Health	From Concord	9.58	3.60	2.16	.79	.003	.017	Very pure.
10601	Rev. Bennett Smudes, Raleigh	Charlotte water supply	4.83	3.10	1.75	.23	.005	.090	Very good.
10602	Col. A. D. Cowles, Raleigh	St. Mary's School	14.25	4.90	3.25	2.62	.008	.063	Very good.
10603	Gen. A. D. Cowles, Raleigh	Camp Bryan Grimes	4.94	1.60	.50	.17	.070	.310	Unsafe.
10605	Gen. A. D. Cowles, Raleigh	Well east end Floral Hall	4.33	2.4	1.17	.35	.096	.216	Unsafe.
10606	Gen. A. D. Cowles, Raleigh	Well between Grand Stand and Floral Hall	4.00	2.1	.92	.33	.100	.170	Unsafe.
10607	Gen. A. D. Cowles, Raleigh	Supply of Camp Grimes	4.53	1.5	.42	.17	.030	.227	Unsafe.
10608	W. B. Ballard, Franklinton	Well	2.75	2.1	.92	.42	.010	.137	Slightly suspicious.
10610	W. P. Neal, Louisville	Surface well	6.97	3.5	2.08	.92	.010	.032	Very good.
10611	J. M. Wooten, Coahoma	Driven well, Reidsville	20.83	4.75	3.12	11.25	.013	.222	Unsafe.
10612	Henry E. Knox, Jr., Charlotte	Caledonia farm	4.83	2.40	1.16	.16	.008	.017	Very pure.
10614	William Dunn, Newbern	Well, Riverside farm	4.50	3.20	1.83	.33	.016	.010	Very pure.
10615	H. M. Farnsworth, Raleigh	Surface well	9.58	8.75	6.45	.50	.010	.057	Quite pure; rather hard
10618	Clayton Giles, Wilmington	From Sound place	14.83	9.20	6.83	3.00	.023	.205	Unsafe.
10622	T. H. Blount, Washington	Cistern water	10.66	4.40	2.66	1.70	.213	.232	Dangerous.
10624	T. H. Blount, Washington	Well	8.50	3.85	2.38	.06	.067	.067	Quite good.
10625	Virginia Cotton Mills, Swepsonville	Fallis, No. 1	29.75	30.60	23.33	2.83	.090	.106	Fair, but too hard.
10626	Virginia Cotton Mills, Swepsonville	Cook, No. 2	13.50	13.50	10.42	.66	.000	.030	Very good, but too hard
10627	Virginia Cotton Mills, Swepsonville	Crawford, No. 3	28.58	28.00	21.66	3.00	.000	.056	Very good, but too hard
10628	Virginia Cotton Mills, Swepsonville	Frazier, No. 4	15.33	14.60	11.33	1.66	.003	.031	Suspicious; too hard.
10629	Virginia Cotton Mills, Swepsonville	Factory, No. 5	14.92	12.00	9.17	.54	.200	.112	Suspicious; too hard.
10630	Virginia Cotton Mills, Swepsonville	Behind Cicero's house, No. 6	10.00	7.80	5.66	.96	.003	.027	Very good; slightly h'd
10631	Virginia Cotton Mills, Swepsonville	James, No. 7	12.00	11.6	8.83	1.08	.010	.110	Fair; too hard.
10632	Virginia Cotton Mills, Swepsonville	J. D. Clark's No. 8	11.33	5.50	3.75	1.08	.000	.045	Very good.
10633	Virginia Cotton Mills, Swepsonville	Boat landing, No. 9	8.75	5.70	3.92	1.66	.006	.041	Suspicious.
10634	H. M. Farnsworth, Raleigh	Not given	8.75	5.70	3.92	1.66	.006	.041	Suspicious.
10639	S. B. Bundy, Monroe	Town artesian well	9.83	6.00	4.17	6.25	.006	.035	Very good.
10640	Col. A. Q. Holladay, Raleigh	Main building well, No. 1	2.00	1.60	.25	.25	.030	.030	Very good.
10641	Col. A. Q. Holladay, Raleigh	Dormitory well, No. 2	2.33	2.20	1.00	.25	.030	.065	Very good.

10642	J. D. Aaron, Mount Olive	Well	3.42	2.40	1.17	.29	.006	.021	Very good.
10643	Cotton Mills, Mooresville	Well	6.70	3.10	1.70	0.2	.033	.017	Very good.
10644	W. S. McNair, Maxton	No. 1	11.0	2.30	1.08	.50	.96	.333	Bad.
10646	A. H. Probst, Concord	Well	14.00	8.90	6.58	1.33	.106	.090	Fair; rather hard.
10647	Mrs. G. W. Kidder, Wilmington		2.67	2.70	1.42	.17	.086	.105	Fair.
10648	W. C. Holman, Raleigh	No. 1, from well	14.20	4.6	3.0	1.8	.107	.140	Suspicious.
10649	W. C. Holman, Raleigh	No. 2, from well	15.50	6.0	4.2	2.6	.036	.053	Good.
10650	Col. W. H. Cheek, Henderson	Spring	7.30	4.7	3.1	0.4	.400	.337	Dangerous.
10651	T. J. Reckman, Hendersonville	Well	3.80	3.2	1.2	0.3	.020	.042	Very good.
10652	W. S. McNair, Maxton	No. 2	2.30	3.2	1.8	0.4	.010	.020	Very good.
10653	Marcellus Smith, Falkland		7.40	6.1	4.2	0.3	.063	.075	Unsafe.
10655	A. L. Vinson, Medoc	In race track	2.50	3.6	2.2	0.5	.016	.275	Good.
10656	Adjutant D. Clark, Camp Russell		3.00	2.5	1.2	0.4	.089	.128	Suspicious.
10658	Adjutant D. Clark, Camp Russell	South end Grand Stand	3.30	2.0	0.8	0.5	.067	.110	Fair.
10659	Adjutant D. Clark, Camp Russell	North end Grand Stand	3.20	1.9	0.7	0.3	.044	.072	Good.
10660	J. F. Miller, China Grove		9.70	3.1	1.8	0.8	.023	.077	Good.
10662	Adjutant D. Clark, Camp Russell	Well near officers' mess	10.00	2.2	1.0	0.3	.053	.169	Suspicious.
10663	Adjutant D. Clark, Camp Russell	East end Floral Hall	3.00	2.0	0.8	0.4	.063	.095	Fair.
10666	Dr. P. L. Murphy, Morganton	No. 1, driven well	2.50	2.3	1.1	.25	.044	.062	Good.
10667	Dr. P. L. Murphy, Morganton	No. 2, Mountain line	2.80	2.0	0.8	0.2	.022	.098	Good.
10668	Dr. P. L. Murphy, Morganton	No. 3, gathered ice	1.70	2.1	0.9	0.2	.173	.225	Unsafe.
10669	S. I. Sutton, LaGrange	Driven pump	2.10	1.8	0.9	0.6	.067	.056	Good.
10670	T. J. Watkins, Poplar Hill	Driven well	30.60	8.7	7.8	12.9	.013	.042	Very good; rather hard
10671	A. V. Kornegay, Goldsboro	Well	5.00	3.3	2.5	0.9	.040	.084	Good.
10672	J. A. Burns, Cedar Hill	Spring	8.60	3.0	2.1	5.0	.200	.072	Unsafe.
10674	Milton Southerland, Wallace	Artesian well	12.90	11.3	8.58	0.3	.213	.017	Good; rather hard.
10675	R. J. W. Anders, Ivanhoe	Artesian well	13.92	13.70	10.58	0.29	.100	.085	Good; rather hard.
10676	R. J. W. Anders, Ivanhoe	Driven pump	2.53	2.4	1.17	.33	.000	.085	Good.
10677	R. K. Proctor, Jr., Lumberton	Driven well	2.85	1.80	0.66	0.3	.028	.030	Very good.
10678	R. K. Proctor, Jr., Lumberton	Artesian well	10.00	9.20	6.83	.37	.053	.007	Very good; rather hard
10679	Virginia Cotton Mills, Swepsonville	Pulley, No. 1	28.00	23.70	18.08	2.87	.003	.042	Pure, but very hard.
10681	Virginia Cotton Mills, Swepsonville	Factory, No. 5	13.33	12.40	9.50	0.5	.006	.087	Good, but quite hard.
10682	Virginia Cotton Mills, Swepsonville	Battle, No. 10	11.50	10.00	7.50	.83	.030	.107	Good, but hard.
10683	Mrs. P. L. Bridges, Wilmington	Cistern	5.83	5.60	3.83	.17	.000	.053	Very good.
10684	A. M. Young, Charlotte	Well	36.92	15.30	11.92	9.33	.000	.086	Good; quite hard.
10685	J. T. Pope, Weldon	Halifax farm	25.83	10.20	7.66	7.75	.023	.050	Very good; hard.
10687	Henry F. Knox, Jr., Charlotte	Driven well	15.42	6.50	4.58	4.08	.260	.065	Suspicious.
10688	B. Urquhart, Lewiston	Spring	7.92	4.20	2.66	0.79	.000	.000	Remarkably pure.
10690	R. Roberts, Patterson Springs	No. 1	2.50	2.20	3.66	3.25	.083	.045	Good.
10691	R. Roberts, Patterson Springs	No. 2	2.08	2.20	1.0	0.17	.086	.002	Very good.
10692	George T. Jones, Rocky Point	No. 1	9.00	4.1	2.58	0.23	.023	.092	Very good.
10693	George T. Jones, Rocky Point	No. 2	13.50	12.9	9.92	0.66	.046	.032	Very good, but hard.
10697	John D. Walters, LaGrange	Pump	3.50	2.0	0.83	0.21	.000	.015	Excellent.
10699	Mrs. J. B. Broadfoot, Fayetteville		2.92	4.0	2.50	0.17	.050	.087	Good.

No.	Name and Address.	Location.	Total Solids.	Hardness	Calcium Carbonate.	Chlorine.	Ammonia Free.	Ammonia Albuminoid.	Remarks.
10700	William J. White, Warrenton	Well	13.66	4.6	3.00	2.75	.023	.025	Very good.
10702	E. B. Borden, Goldsboro	Artesian well, No. 1	5.00	4.3	2.75	.37	.056	.005	Excellent.
10703	E. B. Borden, Goldsboro	Artesian well, No. 2	6.42	3.5	2.08	.33	.036	.005	Excellent.
10705	Grady Smith, Clinton	Well	7.33	3.7	2.25	1.67	.073	.061	Good.
10706	J. D. Sayer, Leavitt	Well	1.50	2.0	0.83	0.25	.013	.027	Excellent.
10707	W. M. Tyndall, Dover	Well	24.75	17.7	13.92	0.25	.013	.112	Fair, but too hard.
10712	Worth Manufacturing Company, Worthville.	Home well	7.00	4.6	3.0	0.83	.030	.040	Dangerous from nitrates.
10713	Worth Manufacturing Company, Worthville.	Office well	8.08	5.0	3.33	0.83	.010	.035	Dangerous from nitrates.
10715	Harlee MacCall, Statesville	Pump at Dr. T. E. Anderson's	1.08	2.4	1.17	0.17	.003	.010	Remarkably pure.
10716	Harlee MacCall, Statesville	Well at Mrs. McCaul's	3.42	2.3	1.08	0.29	.024	.035	Very pure.
10718	F. A. Weihe, West Raleigh	No. 1, from well	2.67	2.1	.92	0.12	.015	.137	Fair.
10721	Col. W. J. Hicks, Oxford	Well	5.83	4.5	2.92	0.33	.006	.130	Fair.

SMALL-POX.

For the past two or three years small-pox has been more or less prevalent in various parts of the country, but our own State escaped until the beginning of the present year, her first case appearing at Wilmington in January. Since that time there have occurred in fourteen counties 137 cases, distributed as follows: Alamance, 2; Buncombe, 3; Clay, 10 (all in one family), Catawba, 6 (in one family); Durham, 2; Edgecombe, 13 (two families); Iredell, 67; McDowell, 2; Mecklenburg, 5; New Hanover, 4; Rockingham, 1; Rowan, 20; Tyrrell, 1 (?); Wilson, 1. The remarkable feature of the disease, as we have seen it, is the extremely small death rate, only two deaths having occurred in the 137, both in Mecklenburg. This gratifying fact was doubtless due to the warm weather prevailing, as small-pox is much more dangerous in winter, owing to the complications of catarrhal character likely to supervene at that season. At this writing, the last of December, there are only four cases in the State—two in Wilmington, convalescent; one in McDowell, of the confluent variety and likely to die; and one in Tyrrell, which has just been reported as suspicious, but from the history and description given of the case, it is doubtless small-pox.

A large majority of the cases were negroes; and when we consider their gregarious habits, their unsanitary environment generally, particularly their overcrowding in small houses, it is simply a marvel, in view of the lamentable fact that a very large proportion of them, as well as of the whites, are unprotected by vaccination, that we escaped a widespread epidemic. Earnest

effort has been made to get the people vaccinated, but there seems to be a deep-seated prejudice against it, and they have generally been without avail except when a case of small-pox was actually present in a community.

In the following extracts from the editorial columns of the Monthly Bulletin of the Board, which appeared from time to time under the heading, "Small-pox in North Carolina," beginning with the January number, the history of the disease within our borders is given more in detail.

In the December, '97, number, this warning was printed:

[From Bulletin, December, 1897.]

Small-pox, it is said, is prevailing in thirty counties of Georgia, some of which are quite near our border, and it has also made its appearance in Rock Hill, S. C., which is also quite close to us. We would suggest to the Superintendents of those counties near the infected districts the advisability of encouraging, as far as possible, among their people a panic on the subject and, under its influence, vaccinate the last one of them.

[From Bulletin, January, 1898.]

This justly dreaded disease which has been hovering on our southern border for some time, has crossed the line. Notice has been received from Dr. McMillan, Superintendent of Health of New Hanover County, that a case of small-pox in Wilmington was reported to him on the 12th instant. The person affected is a negro train hand of the Atlantic Coast Line whose run was into South Carolina, and, although the infection can not be particularly traced, it was doubtless obtained in that State, as the disease has been and is more or less prevalent there. We are also informed by the Superintendent of Health of Columbus County (to the south of Wilmington) that this man on his last trip north mingled with the loafers around more than one of the stations he passed through.

Now, while the patient has been rigidly quarantined and every one known to have been exposed has been vaccinated, it is impossible to say how many may have been exposed of whom the authorities have, and in the nature of things could have, no knowledge. Fortunately our chief city of Wilmington has an excellent local Board of Health, of which our own President, Dr. Thomas, is a member. We therefore feel assured that everything will be done in

that community to prevent the spread of the disease. We wish we could feel the same degree of certainty that other communities which are gravely threatened would take promptly the steps necessary to prevent the introduction, or at any rate the spread of the disease should it effect an entrance, by encouraging and enforcing, as far as possible, general vaccination. The number of persons in the State who have never been vaccinated at all is something which, in view of a threatened invasion of small-pox, is fearful to contemplate. The element most liable to infection is the poorer class of people, who are generally crowded together under unsanitary conditions. These must be vaccinated, if at all, free of charge. The law has provided for this by making it the duty of the County Superintendent of Health to do the work and requiring the County Commissioners to furnish the money for vaccine. But County Commissioners are not infrequently very chary about spending money in unusual directions. We can not understand, though, how any board of intelligent men alive to the interests and welfare of their people could hesitate a moment in this matter. Leaving out entirely all considerations of life and health, the damage that would be caused to the purely material interests of a county by the appearance therein of a single case of small-pox even would be greater by more than a hundred fold than any outlay for vaccine could be. The responsibility in this connection resting upon the County Superintendent and the County Commissioners is a heavy one, and failure to meet it promptly and fully would, in case of occurrence of small-pox within their jurisdiction, not only entail the keenest regret, not to say remorse, personally, but also the reproaches and condemnation of their people. And justly so. The tendency to let things drift and to take the chances is very pronounced in many people, but this is too serious a matter to run any risks. It is generally accepted that a man has no right to unnecessarily jeopardize his own life. He certainly has no right to subject others to a grave danger which he could not only avert, but which it is made by law his duty to avert. We do earnestly hope that all Superintendents and County Commissioners in the threatened districts will realize their responsibility and act promptly.

For the benefit of our readers, and especially for the benefit of all health officers, mayors, county commissioners, school teachers and physicians we reprint those sections of the law bearing on our subject. These things are easily forgotten and a reminder is often helpful.

(The sections of the Act relating to the Board of Health were then given.)

To anticipate further inquiries which we are sure will be made of

us, as they have been, we desire to say that the Board does not furnish vaccine. Several years ago when there was a small-pox scare, and that too a great deal more pronounced than the present one, we invested \$7 in a hundred points in the hope of expediting and encouraging vaccination as much as possible. The total demand amounted to just thirty points. It is needless to say that with our small appropriation we promptly retired from the vaccine business. But it can be obtained from the following reliable firms, the price in small lots being \$1 per 10 points:

National Vaccine Establishment, Washington, D. C.

Lancaster Vaccine Farm, Marietta, Pa.

Dr. Francis A. Martin, Roxbury Station, Boston, Mass.

New England Vaccine Co., Chelsea Station, Boston, Mass.

We would respectfully suggest to our cities and larger towns the advisability of having a pest-house at least "in sight" in case small-pox should appear, for it is not always easy to secure a proper place for isolation after the disease appears. We remember with much pride how our own city of Raleigh acted twelve or fifteen years ago when small-pox was in the vicinity. Land was rented, a two-room cottage built, vaccine bought, physicians employed, and practically everybody vaccinated. In short, everything was snug and taut for the expected storm. "In time of peace prepare for war."

[From Bulletin, February, 1898.]

We note in the last issue of *The Medical Record* that the telegram sent to the daily papers from Chattanooga recently, to the effect that "it is estimated that there are one thousand cases of small-pox in northern Georgia, Tennessee, North Carolina, southern Kentucky and Virginia," is quoted. As our friends in the States named—excepting Georgia, as it has no State Board of Health—have forgotten, or ignored, the agreement entered into ten or twelve years ago by the members of the National Conference of State Boards of Health to report to one another the occurrence of cases of this disease, we have no official information to go upon, but we believe the estimate is grossly exaggerated. It is certainly inaccurate, for South Carolina is not mentioned, and it is from that State that the infection came to both Wilmington and Charlotte. Five cases in all have been reported to this office so far, two in Wilmington, six in Charlotte and one in Clay County. We have seen, also, the statement in the daily press that one mild case had occurred in Lincoln County, which, we regret to say, now has no Superintendent of Health. Superintendents of Health are required by law, under penalty, to report all cases of small-pox, yellow fever, typhus fever and cholera occurring within their jurisdiction to the Secretary of the State Board.

The disease has not spread in Wilmington, nor has it in Charlotte,

except to two children of the first case there, both of whom having been promptly vaccinated, have it in a modified form and will recover. The last Charlotte case did not originate in the city. Its history is as follows: A negro laborer went from Greenville, S. C., to Neal's camp, twelve miles north of Mooresville, just in the edge of Rowan, seeking employment on the Mocksville and Mooresville extension of the Southern Railway, and arrived there sick on the evening of Sunday, 9th instant. He slept that night in a hut with two others, besides coming in contact with others. Next morning he noticed an eruption on his face, and suspecting its significance, and fearing that he would be quarantined, he quickly took to the woods and attempted to make his way to his home in South Carolina. Weakened by the disease, fatigue and privation, he succumbed on Tuesday about two miles from Charlotte, and hailing two passing bicyclists from his place in the woods, telling them the nature of his trouble, they promptly notified the authorities, and he was taken to the hospital. But we feel very anxious lest he has spread the infection during his last wanderings. Those known to have been exposed have been quarantined and everybody possible vaccinated, we are informed by the Superintendent of Health, Dr. Whitehead; but he adds that, owing to a most unreasonable and bitter prejudice felt by many against vaccination, and the dread of being sent to the pest-house, he fears that many who were exposed would conceal the fact. We await developments, therefore, with misgiving, but we are somewhat encouraged by not hearing of any new cases in that district after eleven days, though we realize, of course, that lapse of time does not take us "out of the woods."

What are we to do in this matter of vaccination? How can the vaccination of the people be practically accomplished? Will some of our contemporaries of more experience tell us? We have seen the attitude of hostility assumed by many in the rural districts of Rowan, and it is a matter of record that in Wilmington, our largest city, the attempt to enforce vaccination was a failure. The physicians appointed by the city to do the work were abused and villified, and actually threatened with personal violence in some instances if they should attempt to carry out their instructions and the effort was finally abandoned. The opposition was chiefly among the negroes, the very class that is in greatest danger from the disease. In Charlotte, we are glad to say, the efforts in this direction were more successful, about fifteen thousand having been vaccinated at last accounts. The acting Mayor of Charlotte, Dr. R. J. Brevard, jailed a recalcitrant—all honor to him!—and it had, as was to be expected, a most wholesome effect.

There being a difference of opinion among the physicians as to the true nature of the last Charlotte cases, Mayor Springs requested

us to ask the Marine Hospital Service for an expert to settle the question. We did so, of course, at once, and we desire to make our acknowledgments to Surgeon-General Wyman for his kind response in ordering Passed Assistant Surgeon Wertenbaker, now stationed at Wilmington, to report at Charlotte immediately for the purpose. He did so, and below is his report:

CHARLOTTE, N. C., Feb. 11, 1898.

To His Honor E. B. Springs, Mayor of Charlotte, N. C.

SIR:—In obedience to telegraph instructions from the Surgeon-General, United States Marine Hospital Service, I reported to your representative last evening, February 10, 1898, for the purpose of examining and reporting upon the nature of certain cases of sickness now in the pest-house on the outskirt of Charlotte. I have the honor to report as follows:

Accompanied by Drs. Strong and Wilder, I this morning visited the pest-house of your city, and found therein nine (9) persons, all colored. Four of these are suffering with small-pox; the other five, having been exposed to the disease, are now detained, awaiting developments, and are employed in nursing the sick. The following named persons are suffering from the disease: Sally Wagner, Oscar Jackson, Frank Jackson and Harvey Perkins. Sally Wagner and Oscar Jackson are recovering, both having had a light attack of the disease.

Frank Jackson, aged four (4) years is a son of the case that died with small-pox recently. Frank developed the eruption on Wednesday last, and has a very light attack. In the cases of Sally Wagner, Oscar Jackson and Frank Jackson, the disease has been modified by vaccination. Harvey Perkins, aged 57, nativity, North Carolina, developed the eruption last Monday morning at Neal's Camp, twelve miles north of Mooresville, on the Mocksville extension branch of the Southern Railroad. He had come from Greenville, S. C., and arrived at the camp on Sunday evening, and slept with some of the employees on Sunday night. On awakening Monday morning, he noticed that he was broken out with the eruption. He left the Camp quietly, without mentioning the eruption to any one, and made his way to Charlotte—arriving yesterday afternoon—(February 10, 1898.)

He is now in the fifth day of the eruption, and his case is typical. I have the honor to remain,

Respectfully yours,

C. P. WERTENBAKER,

Passed Assistant Surgeon, U. S. Marine Hospital Service.

SUGGESTIONS.

Referring to the request of your representative, expressed last evening, that I would make any statement, or offer any suggestion that would be of service, that would protect the city from small-pox, and relieve the situation here, I beg to submit the following remarks:

As to the danger of the spread of the infection from these cases of small-pox, now in the pest-house, I am of the opinion that there is none, so long as the present methods of quarantine are enforced.

The danger to the city lies in the possibilities of the disease being imported from elsewhere, and finding unprotected persons here, may claim new victims and establish new foci of infection.

I beg to state, that from what I have learned of the method of your health authorities, they have been well conceived, and well executed, as the circumstances would permit.

As to the methods of prevention of small pox, there are only two practicable. One is to prevent its introduction and the other is to give it no material to feed on. With the number of cases of small-pox at present scattered through the Southern States, it is not practicable to prevent its coming into this city. So the only alternative is to be prepared, leave no person in the city who is unprotected to become a victim. I am informed that there has been some opposition on the part of some of your citizens to the ordinance requiring every person to be vaccinated, or show that they are otherwise protected against small-pox. As far as I can learn, this opposition is based chiefly on the ground that in some instances the vaccinated person has been temporarily disabled, due to inflammation of the arm, and has been unable to attend to his business. I believe that as a general rule, excessive inflammation following vaccination, is chiefly due to some injury or irritant to the vaccination wound, rather than to the virus, and if the wound is properly protected but little, if any, inconvenience will follow vaccination.

On the other hand, it would seem to be a duty that every individual owes to himself, his family, friends, and the community at large, to protect himself from small-pox, and the possibility of becoming a focus of infection to the whole city.

That it is possible to be brought in contact with small-pox at any time and place, is evidenced by the case of Perkins, who wandered to this city yesterday afternoon. As it happened, he was unable to come into the city, so fell by the wayside and made known his disease.

Had he been stronger, he would have come into the city; he might have stood next to any one in a crowd and infected him, he might have come in contact with one of your servants, and this way sent the disease into your own homes. I thoroughly believe in vaccination, and believe that it is the chief available means of protection from small-pox. I am sure that the people of Charlotte will appreciate the efforts of their health officers to protect them from small-pox, and that they will voluntarily aid them in this protection of every hearth and home.

[From Bulletin, March, 1898.]

No new cases have been reported this month. The most recent cases were in Clay County, and Dr. Sanderson, Superintendent of Health of that county, writes me that they are all well, and that he is ready with the most approved formaldehyde apparatus to thoroughly disinfect the premises and to raise the quarantine.

We are very much gratified at the management of the disease in our State by the local authorities. In Wilmington two cases occurred, both infected in South Carolina; no deaths; no spread. In Charlotte, total number of cases five, three infected in South Carolina, and two (children of one of the three) taking the disease from the father; two deaths; no further extension. One case coming from Birmingham, Alabama, occurred in Alamance County, near Gibsonville. That was the only case there; recovered. A young

man returning from North Georgia to his home in Clay County brought the seeds of the disease with him and infected his family, every one of whom—ten in all—were attacked, but none died. While the color of these last-named cases was not given, it is more than probable that they were white, as negroes are scarce in our mountains, but all the others were negroes. We are hopeful that we may have no more cases.

[From Bulletin, April, 1898.]

On the 30th of March we received a telegram from the Superintendent of Health of Rowan County announcing a "probable case of small-pox" at Salisbury. A subsequent report stated that it was genuine, and that the patient would recover. The person affected was a colored postal clerk on the run between Salisbury and Knoxville. The source of contagion was easily traced to a case of small-pox which occurred and remained in the clerk's Knoxville boarding-house. Dr. Whitehead, the Superintendent, promptly took the necessary preventive measures—how thoroughly and successfully is attested by the fact that up to the present writing (three weeks) no new case has occurred.

On the 14th instant (April) Dr. Fletcher, the municipal health officer of Asheville, reported a case of small-pox in a negro ten days from Jacksonville, Fla. As the case occurred in a negro restaurant we are anxious lest the disease spread, notwithstanding the precautions taken by the health officer.

We regret to learn that a deep prejudice against vaccination crops up every now and then, chiefly among the ignorant—the very element of the population which, owing to the over crowding and other sanitary conditions usually co-existent with ignorance, is in peculiar need of the protection afforded by vaccination. The question is how to overcome this prejudice. We have more than once asked our readers for suggestions as to the best practical method of getting the people vaccinated, but not one has responded. It is easy to understand why it is a problem extremely difficult of practical solution. Fortunately the feeling against vaccination is sporadic, and we shall console ourself with the hope that as time passes and knowledge spreads this prejudice will disappear.

Since the above was sent to the printer we have received the following, under date of April 19th, from Dr. Fletcher: "We have the second case of small-pox, imported from Spartanburg, S. C. She ran away from Spartanburg to prevent being taken to the pest-house. Was broken out when she came to Asheville. Was in her own house from Monday night till Friday morning before she was discovered, and a number of people went to see her. Both patients (negroes) are properly quarantined in the pest-house which we estab-

lished with difficulty—met with armed resistance. Judge Hoke refused to enjoin our Board of Health till we had a hearing. Long before the day set for a hearing came I had my house built (a comfortable two-room house) and my patients in it. For fear of having to pay a big bill of costs the opposition withdrew the application for injunction. We are vaccinating every one as fast as possible; are meeting with some opposition. We have a compulsory vaccination ordinance and mean to fight it out along these lines with tact and discretion.”

It is evident that the Health Officer of Asheville is made of the right kind of timber.

[From Bulletin, May, 1898.]

Only one case has been reported in May up to date of this writing. 18th. This is a negro “missionary preacher” at Statesville. The notification, by telegraph, was received on the 17th, and no particulars as to isolation, vaccination, etc., have come to hand, but we feel assured that Superintendent Long will carefully look after these.

[From Bulletin, June, 1898.]

Eleven cases reported in Statesville and Belmont, a suburb thereof. All isolated in pest hospital and eight about well. Another case reported as present at Vanderborg’s Chapel. It is strictly quarantined.

There being a disposition on the part of the people to break over the quarantine, notwithstanding all the local physicians were agreed as to the diagnosis, the Superintendent of Health asked for an expert to be sent to back him up. In compliance therewith we requested Surgeon-General Wyman, Marine Hospital Service, to send one. Dr. Wertenbaker was sent, and reports to us that the outbreak is well managed by the local authorities.

[From Bulletin, July, 1898.]

During the past month there has been a material spread of the disease, both as to the number of cases and localities infected. When we last went to press, it was reported as present at only two points—Statesville and Vanderborg’s Chapel, both in Iredell County. At this present writing (July 19), small-pox exists in addition at Mooresville, 1 case; Elmwood, 2—both in Iredell; Asheville, 1; which is nearly well; Catawba, 6, in one family in southeastern part of county; Cleveland in Rowan county, 7; Reidsville, 1; Durham, 1.

When the Superintendent of Health of Rowan county was first notified of the existence of small-pox at Cleveland he found 20 cases, 13 of whom had recovered. They had been diagnosticated as

chicken-pox, urticaria, and pemphigus, and no precautions whatever were taken in consequence. The people, we are told, called it "elephant itch"—not a bad name, as the eruption of small-pox is about the biggest thing of its class, in what it means, at any rate.

A negro from Cleveland went to Reidsville, and was there two days with the eruption of small-pox on him before he was discovered. During that time he went on an excursion and mingled promiscuously with his people. One of these who had been exposed went from Reidsville to Durham in the beginning of the eruption stage. Although sought for he was not found until next morning, after he had slept in the same room with several others. Reports from Asheville, Iredell County, generally, Cleveland and Durham, show everything in good shape except the reluctance in too many instances of the people to be vaccinated. The reports, however, from Catawba County and Reidsville are not at all satisfactory, and we fear a spread of the disease in those localities.

In the fear of an epidemic of the disease, and knowing the defencelessness of great numbers of our people from want of vaccination, and the unpreparedness of our cities and towns, as a rule, for taking care of such outbreaks, the article given below, entitled "In Regard to Small-pox," printed in the July Bulletin, was sent to every registered physician in the State and to many other citizens. That no time might be lost, it was printed in circular form in advance of the issue of the Bulletin, and mailed to all Superintendents of Health and to the editors of all the newspapers in the State, with this letter:

RALEIGH, N. C., July 20, 1898.

Editor-----

DEAR SIR:—I enclose advance sheets of the forthcoming Bulletin of the Board of Health, setting forth certain things in relation to small-pox that should be known of the people. In their interest I ask you to publish it—or so much of it as you think proper—in your paper, and call attention to it editorially.

As you already know, small-pox exists at a number of points in the State, and a still wider dissemination of it is to be expected. There is no telling where it will appear next, and every community should be prepared. It is such a dangerous and such a loathsome disease

that any information as to how to prevent it, and how to check its extension after its establishment ought to be welcome to the people. You would do a public service, I think, in granting this request.

Very truly yours,

RICHARD H. LEWIS, M. D.,
Secretary.

[From July Bulletin, 1898.]

While the instructions for quarantine and disinfection issued by the Board several years ago in compliance with the requirements of section 9 of the act in relation to the Board of Health, really embody all that is necessary, if faithfully carried out, for the restriction of contagious diseases, it is thought advisable in view of the prevalence of small-pox in one section of the State, and the strong probability of its spreading, to issue fuller and more specific directions as to the management of that particular disease.

In order to be perfectly plain, it may be necessary to be somewhat elementary and the well informed Health Officer must not consider what is said as a reflection upon his intelligence and knowledge. It should be remembered that this is merely a supplement to the "Instructions" and the two must be read together.

We will consider the subject in its relation, 1, to the patient; 2, to the physician; 3, to the general public; 4, to the municipality, and finally, 5, to vaccination.

1. *The Patient.*—Owing to the tendency in human nature to put away disagreeable things, it seems that in many cases the attending physician is loath to admit that the case is one of small-pox and calls it chicken-pox, urticaria and even pemphigus, while the people in one locality, at least, denominate it "elephant itch." When a mistake is made in the diagnosis, or until it is correctly made, no precautions are taken, as a rule, and free intercourse with the patient being allowed, the infection is spread. The diagnosis is not difficult, but as no chances should be taken, the obviously proper thing to do whenever there is any doubt about it is to manage the case as if it were small-pox. When small-pox is prevailing, every one with an eruption who a few days before its appearance had a headache, pain in the back and fever, should be strictly quarantined until time has settled the question. Above all things the patient should be properly cared for. This is not a superfluous suggestion—as it ought to be—for it occasionally happens that the cry of small-pox produces such an acute and general panic that the poor sufferer is more or less neglected, for a while at least. There is no excuse for this, as thoroughly vaccinated persons can handle such cases with as little danger as they could measles.

2. *The Physician.*—The greatest care should be taken by the physician to avoid carrying the infection to others. He should have a special suit of clothes during the warm weather of some material that will wash—or better, perhaps, a long gown of linen or cotton, buttoning close around the neck above the collar and tightly around the wrists, to be worn over his ordinary clothes, with a cap of paper or oiled silk completely covering his hair, while his feet are protected by rubber shoes. The garments should be donned in an uninfected room, or out of doors if there is no room, and removed upon returning to the same from the room of the patient. If the disease is present in only one house, the special suit can be left there, but not in the room with the patient. If, however, there be cases in other houses to be seen, it can be rolled up and carried in a close-shutting hand-bag. To make assurance doubly sure, it would be well after the rounds for the day have been made to hang it up in a box or closet or wardrobe in an unoccupied room and disinfect it with one of Schering & Glatz's small formaldehyde lamps. Before going to bed hang it out of the window to remove the formaldehyde odor. Do not forget to disinfect the hand-bag also, if one is used. Before leaving the premises the hands and face (beard particularly) should be washed with some reliable antiseptic—bichloride of mercury, 1 to 2,000, or a 2 per cent solution of carbolic acid, for example.

3. *The General Public.*—The people should bear in mind the fact that there is no reason whatever for becoming panic-stricken at the announcement of small-pox in their community—by no means such good reason as on the appearance of diphtheria or scarlet fever. In small-pox alone of all the contagious diseases have we a sure preventive—vaccination. All one has to do in such circumstances is simply to get his physician to successfully vaccinate him and go on his way rejoicing without the least fear or anxiety. Should the disease become epidemic and the first vaccination fail to take, it would be well for the sake of certainty to be re-vaccinated at the end of a week. It is to be borne in mind that this advice regarding the necessity for vaccination applies with almost equal force to those persons who have been vaccinated in childhood and have reached adult life. For while it is true that the primary vaccination done in early life may in most instances protect the persons through life, this immunity for so long a period can not be assured, and to make themselves safe, it is most advisable to have the vaccination done again. This will appear reasonable, when it is remembered that if the person vaccinated in early life does contract small-pox, it will only develop into a very mild form of varioloid; but it must not be forgotten that this mild form, this varioloid, is of the same nature as the severer forms, and will excite in the unvaccinated typical and often fatal small-pox. Good citizens should and would hold up the hands

of the powers that be and cheerfully render every possible assistance in carrying out thoroughly and loyally the plans devised for stamping out the disease. No dependence, to the exclusion of vaccination, should be placed upon quarantines, for inland quarantines are notoriously ineffective.

4. *The Municipality.*—The authorities of any city or town liable to become infected from other points should not wait until the disease actually appears in their own community, but make their preparation for taking care of and checking its spread in advance. The proper management of small-pox demands a hospital consisting of at least four rooms—preferably two small houses of two rooms each—for the separate accommodation of both sexes of the two races; and a larger house for the detention of those known to have been exposed, until the period of incubation—say fifteen days—has passed. As we never think lightning is going to strike us, such complete anticipatory preparation can hardly be expected, but preliminary arrangements ought to be made for providing, with the least possible delay, these necessary buildings. Tents would answer in warm weather. When a case appears in the town itself an abundant supply of first-class virus should be ordered by wire, arrangements should be made with a sufficient number of physicians to perform the work quickly, and everybody not giving satisfactory evidence of previous vaccination should be vaccinated. If not already in existence, such ordinances as may be necessary, with sufficient penalties attached, should be immediately enacted. Section 25, chapter 214, Laws of 1893, gives all incorporated towns the fullest power in this matter, whether given in their charters or not.

5. *Vaccination.*—There is, we regret to say, considerable opposition to vaccination among the people. This is due chiefly to the prejudice of ignorance, and is, therefore, more difficult to overcome. There is not sufficient ground for this prejudice. While it is true that “bad arms” occasionally follow vaccination, it is but rarely, if the proper precautions are taken in making the vaccination and decent care is taken of the arm afterwards. If good bovine virus is used there is no danger of the transmission of any disease. The heifers in the best establishments are always tested for tuberculosis—even if tuberculosis can be transmitted in that way, which is extremely doubtful, to say the least. Admitting that there is some ground, though by no means sufficient, for the breadwinner of a family to object for himself, there is none for his children. In this connection we believe it would be not only humane, but wise, from a purely business point of view, for all large employers of labor, as mill-owners with us, to insist on the vaccination of all operatives, agreeing, in case of disability therefrom, to pay half wages, or at least enough to prevent suffering.

Vaccination is one of the simplest of operations, but many bad arms are undoubtedly traceable to its improper performance—to the neglect of a little care. Thorough asepsis should be observed. The arm should be scrubbed clean with soap and water, and the vaccination performed with a sterilized instrument, the point itself, which has been already sterilized, if points are used, or if a steel instrument be employed, by wiping it clean and passing it through the flame of an alcohol lamp after each vaccination. To avoid the necessity of carrying the alcohol lamp around in house to house visitation, it has been suggested that the vaccinator carry a paper of fair-sized needles with him, and with these needles scarify the place where he intends to introduce the virus, using a fresh needle for each patient. Do not make the scarifications over a quarter of an inch square, and avoid, if possible, drawing blood, as the cloth in drying takes up and holds some of the virus. It is recommended three or four of these little scarifications be made quite close together in a group. The best opinion at present is that pus infection is less liable to follow the use of the glycerinated lymph, though the points have many friends on account of their convenience and the rapidity with which they can be used. Vaccinate. *Vaccinate!* VACCINATE!! VACCINATE!!!

Receiving a letter from Dr. Alexander, of Tyrrell County, announcing the presence of a case of probable small-pox and asking for advice in the absence of a Superintendent of Health, I immediately replied thereto, and also addressed by the same mail the communication given below to the Board of Commissioners of that county, which explains itself:

RALEIGH, N. C., December 30, 1898.

Board of Commissioners Tyrrell County, Columbia, N. C.

GENTLEMEN:—I learn through a letter received to-day from Dr. Ab. Alexander, of your county, that he has been called to see a case which he suspects to be small-pox. From the description he gives of the symptoms, and from the statement that the patient is recently from Norfolk, I feel quite sure that it is small-pox. The thirteen cases recently occurring in Edgecombe County were traced to a person from Norfolk. Dr. Alexander asks for advice in regard to the management of the case, as there is no Superintendent of Health now in your county. I write him that the only thing to be done is for your honorable Board to elect a Superintendent of

Health, since that official is the only person under the law of the State who is empowered to enforce the proper regulations for the control of contagious diseases. I hope you will do so at your meeting on Monday next. I send you herewith a copy of the act in relation to the Board of Health, and would call your attention particularly to sections 5, 9, 23 and 24. Section 5, as amended by the last Legislature, takes the power of election of a Superintendent from the County Board of Health, and gives it exclusively to the Board of County Commissioners, and makes it mandatory on them to elect. It says they shall elect. So the duty of the Board of County Commissioners in the premises is perfectly plain, and if they fail to carry out the law providing the machinery necessary for the restriction of dangerous communicable diseases, they are of course responsible, especially as no one else is empowered to do it, for their spread among their people.

I would suggest that you order immediately by wire enough vaccine from the National Vaccine Establishment, Washington, D. C., as that is nearest to you, to vaccinate at once at least 100 people—say \$10 worth; and that you see that the Superintendent does his duty and vaccinates first all persons who have been exposed to the disease, and as many more as possible. You should also provide accommodations for the isolation and quarantine of all cases, and for their proper treatment and nursing, and also accommodations for the detention of all exposed persons until the time in which they may break out with the disease has passed. I send you a copy of the Bulletin of the Board containing an article in regard to small-pox, in which you will find definite instructions given for the management of outbreaks of small-pox.

Hoping that you will act promptly and effectively, I am,

Yours truly,

RICH'D H. LEWIS,

Secretary.

SANITARY INSPECTIONS.

PUBLIC INSTITUTIONS.

Owing to lack of means an inspection of all the State institutions was not practicable, so this work was limited to those requesting it, except the School for the Deaf and Dumb at Morganton, which was inspected because it could be done without additional expense.

NORTH CAROLINA COLLEGE OF AGRICULTURE AND
MECHANIC ARTS.

July 27, 1898.

Dr. Geo. G. Thomas, President North Carolina Board of Health.

DEAR SIR:—The committee appointed by you to make a sanitary inspection of the Agricultural and Mechanical College, respectfully beg leave to report:

While the buildings, it being vacation, presented the unkempt and forlorn appearance of a house deserted, we found nothing in them to criticise from the health point of view. We were much pleased with the new hospital building on the whole, but think it would have been better to have omitted in its construction the ornamentation of the rooms in the way of beaded wainscotings and ceilings which afford innumerable cracks for the retention of disease germs, and to have had the ceilings and walls as plain as possible of some hard finish that could be washed—the finish of the ideal modern hospital. However, if the rooms are thoroughly disinfected by some good gaseous disinfectant, as formaldehyde, for instance, after each case of disease of the infectious class, there will be no practical danger. The barn and stables impressed us as being particularly well kept, everything about them suggesting order, neatness and cleanliness.

As the greatest menace to health is a contaminated water supply, we paid special attention to the wells and the privy. The privy, not being in use, could not be properly judged, but it seemed to be good of its kind. We were not pleased, however, with its proximity to one of the wells. We have learned since our visit that a bacteriological examination of the water of that well showed it to be infected with intestinal bacilli. We advise its being disinfected and filled

up. If possible, a system of sewerage should be installed, and we would repeat the recommendation of a former committee of the Board, that the disposal of the sewage be by surface irrigation, if it can not be turned directly into Rocky Branch. Failing sewerage, the next best thing is the tub and dry earth method, which is that now in use. If this be continued we would recommend that the privy be moved further down the hill; that the foundations be so arranged as to prevent the rain water from washing underneath it; that the tubs or boxes be made surely water-tight; that some kind of guide with a stop at the proper point be arranged so that each box may without fail be put in exactly the right place; and that an attachment be added for applying the dry earth or cinders so that it can be done by the janitor quickly—by wholesale, so to speak. Such a device can be seen at the Murphy Graded School in the city. If this system be faithfully carried out, there is no valid sanitary objection to it. Owing to its importance, not the slightest neglect should be tolerated.

Respectfully submitted,

A. W. SHAFFER,

RICH'D H. LEWIS.

Committee.

NORTH CAROLINA PENITENTIARY.

July 27, 1898.

Dr. Geo. G. Thomas, Pres. N. C. Board of Health.

DEAR SIR:—In obedience to your instructions, we have made an inspection of the penitentiary, and respectfully beg leave to report:

We found the buildings and premises in good sanitary condition. We suggested to the management the advisability of changing the wooden night buckets now in use in the cells for metal ones, on the score of cleanliness, but were informed that the change was already being made, as new buckets were needed.

Although it could not be said that the condition of the stable yard was a menace to health, its appearance was not inviting. We would recommend that a small and compact compost heap be used for the conversion of the refuse of the institution into manure, and thereby prevent the littering up of the yard. With an abundance of free labor at command, our idea is that a large prison should present the clean and neat appearance of military barracks.

A. W. SHAFFER,

RICH'D H. LEWIS,

Committee.

WESTERN HOSPITAL AT MORGANTON.

To the Board of Directors of the State Hospital at Morganton.

GENTLEMEN:—By direction of the State Board of Health the undersigned, as a committee from that body, have again carefully inspected this institution, and desire to express the gratification with which the visit was made. The excellent sanitary condition of the premises betokens the wise and watchful judgment of your Superintendent and his subordinates. There is unfortunately an overcrowding in the Hospital which must appeal as well to you as to us. The average yearly increase in the patients in the institution is thirty-six, so that some of the wards, where provision was made in the original plans for twenty-one patients, several more than twice that number are now accommodated. One floor of the ward especially crowded with demented, contains of necessity a number of tuberculous patients, who are also, from their enfeebled state, and exceedingly poor physical condition, incapable of control or direction.

The records of this portion of the buildings show that death from consumption, or other forms of tuberculosis, are on the increase, and this points out the fact that there is also an increase of the infectious germs of the disease. These unfortunates under the evil effects of the overcrowding, and in one floor of the increase of diseases other than mental, can not be so satisfactorily brought under the benign influence of the methods of treatment now in vogue in the hospital.

We most earnestly ask that you will give this matter your attention, and devise ways and means to relieve a situation that is curable by the increase of capacity of the institution, and needs your help as the appointed guardians of the stricken people.

GEO. GILLETT THOMAS, M. D.,

RICH'D H. LEWIS, M. D.,

Committee.

SPECIAL REPORT ON TYPHOID FEVER OUTBREAK.

To the Board of Directors State Hospital, Morganton.

GENTLEMEN:—At the request of the Superintendent of your institution we, the undersigned, a committee of the State Board of Health, have carefully investigated the recent outbreak of typhoid fever among the employees and patients of the Hospital, and respectfully beg leave to report:

The facts, as we learn them from the Superintendent, assistant physicians, and some of the employees who were attacked, are as follows:

There were thirteen cases in all, the first beginning on June 10th, and the last on July 12th. Of this number, one unquestionably contracted the disease at Davidson, and should therefore not be considered in this investigation. The remaining twelve cases may be divided into two groups, the first group (a) composed of three cases, who were attacked respectively on June 10th, 16th and 19th, and the second (b) composed of nine cases, in whom the disease occurred respectively on June 30th, July 2, 3, 8, 9 (4 cases) and 12th.

Two theories of the cause only appeal to us as at all plausible. One is that the ice obtained last winter from the pond was infected with the typhoid fever germs, and the other that a limited amount of the milk supply was infected. After a very careful and deliberate consideration, with full discussion between ourselves and the medical officers of the hospital of the subject, we declare in favor of milk infection. We abandon the ice theory for these reasons: The ice house was opened in April or early May. It was used freely by two or three hundred, at least, of the employees and patients who were allowed outside of the building for more than a month certainly—beyond the extreme incubative period of the disease—before a single case occurred. If the poison had been in the ice, it is very probable that in so large a number using it, at least one would have been attacked. Finally two biological tests of the ice by a competent bacteriologist showed very few bacteria of any kind, and all of those of a benign character. There was no evidence whatever either of the typhoid bacilli or of the colon or intestinal group to which the bacillus typhosus belongs. It should be said that the chemical analysis of the ice indicated too much ammonia, both free, and albuminoid, which was doubtless due to the washing of vegetable matter from the watershed, and possibly some drainage from the stables, though we think this last improbable. At any rate, the demonstration of the absence of the specific germ and of all its associates renders the chemical impurity of little moment.

In considering the theory of milk infection, we are met in the beginning by the adverse fact of the occurrence of the three first cases before the milk could have been infected. Of these three, however, two drank water from a variety of sources remote from the institution, which might have been contaminated. Of the third we can offer no explanation, unless it was the ice to which he had access. The remaining nine cases fit the milk theory very satisfactorily. The case originating July 19th was the dairyman of the Hospital. For four days, with the fever on him, he continued to perform his duties. During that time, being constipated, he was given a purge—which acted very freely. It is not unreasonable to assume that his hands became soiled, and thereby infected with the germs which the simple washing of the hands without any antiseptic would not

remove. In milking, the bacilli found their way from his hands into the milk, and milk being an admirable culture medium, they propagated rapidly. But why, if the milk was infected, did not more of the patients take the disease? Probably because the dairyman poured all his milk into one ten-gallon can, thereby limiting the infected supply. The infection of the can was not continued because, owing to the cleanly methods observed in the management of the dairy, the can was scalded, and thereby disinfected every time it was used.

The strongest point in the argument for milk infection is the fact that all the cases in group (b) occurred in a bunch, and within the usual time after exposure to the poison, from seven to nineteen days after the sick dairyman quit work, the average incubation period of typhoid fever being fourteen days, and the very extreme limits from one to twenty-eight days.

To recapitulate briefly: The water supply of the Hospital was found to be very pure, both chemically and bacteriologically, and was therefore excluded as a possible cause. The ice was used by two or three hundred of the attaches and inmates, was chemically impure, but bacteriologically uncontaminated with the bacilli typhosi or any related bacteria. Only three persons out of three hundred were attacked up to the probable milk infection, two of whom could have easily have gotten the disease elsewhere. The two or three hundred used the ice more than a month before a single one was taken sick. If the germs had entered the ice pond, they would have permeated all the water in it in a day or two, the conditions for their development being very favorable, and a larger number should have shown the disease sooner.

Milk is a well-known medium of transmission of the typhoid fever germs. The dairyman unquestionably, in the light of subsequent events, although the diagnosis of typhoid fever up to the time of his giving up work would not have been justifiable, had that disease for four days, during which he assisted in milking the cows. It is not unreasonable to suppose that the milk drawn by him was infected by his hands, nor that it was put into the one ten-gallon can that was nearest at hand which, if true, would explain the restriction of the disease, both as to number attacked, and short time covered by group (b).

Neither of the two theories suggested fits every case, and neither, therefore, is entirely satisfactory, but the weight of the evidence, in our opinion, favors the view that a limited amount of the milk supply was infected. We ought to say in this connection that no blame attaches to the management of the institution, as there was no reasonable ground for suspecting typhoid fever in the dairyman until after he had quit work.

The fact that we were unable to come to a positive conclusion as

to the origin of the outbreak. led us to think that it would be more satisfactory to your honorable Board to hear a full statement of the case, and that must be our excuse for the length of this report.

GEO. GILLETT THOMAS, M. D.,

RICH'D H. LEWIS, M. D.,

Committee.

SCHOOL FOR THE DEAF AND DUMB AT MORGANTON.

To the Board of Directors of School for the Deaf and Dumb, Morganton, N. C.

GENTLEMEN:—We beg leave to submit to you the result of our visit to the institution under your control, made by order of the State Board of Health. It gives us much pleasure to report a very satisfactory sanitary condition of the buildings generally. They appeared clean and well cared for, and gave evidence of intelligent supervision.

We would most earnestly recommend that the brick floor in the bath rooms and in the passages on the lower floor be covered with a good coating of Portland cement, to prevent the constant accumulation of moisture in and under the bricks, and allow for the more thorough cleansing of the floors. In all the general bath rooms the addition of the spraying apparatus will add much to the value of these rooms to the institution, and to the better care of the inmates.

The walls in the rooms of the infirmary should be painted with not less than three coats of enamel paint, so that in case of the occurrence of infectious or contagious disease appearing in one or more of them, the walls can be thoroughly washed in the process of disinfection, which will always follow the discharge of the patient.

We hope your Board will see fit to adopt these recommendations, as we are convinced they will make for the best interests of the charges under your care.

GEO. GILLETT THOMAS, M. D.,

RICH'D H. LEWIS, M. D.,

Committee.

OTHER ESTABLISHMENTS.

SEWERAGE OF COTTON MILLS AT DURHAM.

WILMINGTON, N. C., August 7, 1898.

Col. A. W. Shaffer, Sanitary Engineer North Carolina Board of Health, Raleigh, N. C.

DEAR SIR:—Dr. John M. Manning, Superintendent of Health of Durham County, desires you to visit his town and advise with him in regard to the disposal of the sewage of the various cotton mills in that vicinity.

Please advise with Dr. Lewis, as he will accompany you, and let Dr. Manning know when you will make this official visit.

I have to thank you for the reports of the visits of inspection to the State Penitentiary and the Agricultural and Mechanical College—I return them, as it does not appear that they are copies, and will advise with Dr. Lewis as to the further disposal of them.

Yours truly,

GEO. GILLET THOMAS,
President North Carolina Board of Health.

RALEIGH, N. C., August 22, 1898.

Dr. R. H. Lewis, Secretary State Board of Health.

DEAR SIR:—I have the honor to report that on the 17th instant, in company with yourself, I visited and inspected the sewerage and drainage systems of the various cotton mills in the vicinity of the city of Durham at the request of Dr. John M. Manning, Superintendent of Health of Durham County, with a view to ascertain the character and condition of the conduits, and the degree of efficiency with which the night-soil or sewage is conducted from the mills and carried to or beyond the city limits.

With Dr. Manning and Mr. Markham, Chairman of the Board of County Commissioners, we visited and carefully inspected the drainage of the East Durham Cotton Mills, the mills of the Commonwealth Manufacturing Company, the Erwin Cotton Mills, and the principal main of the city sewer.

The last we found to consist of terra cotta pipe twenty-four inches in diameter—ample for sewage alone—extending southwestward to the city limits, needing a buttress wall at the point of discharge, but otherwise in good order and condition.

The sewers of the Erwin Mills were of six- and eight-inch terra cotta, respectively, of good quality, recently extended to a point near the limit of the premises, and the ditch recently opened and

banks cleared to the extreme limit of the grounds. We recommend that for appearance and comfort, the ditch carrying the dye-water be piped. There was found nothing to criticise from the professional standpoint of the Board of Health.

The Commonwealth Manufacturing Company conducts its sewage through an eight-inch terra cotta pipe, well under ground and of good quality, northward, to a point near the city limits, and on the day of our visit were engaged in extending it for some four or five hundred feet. No unfavorable sanitary criticism was called for.

The East Durham Cotton Mills adjoin the railroad upon the south and drain to the southwest. Excavation was going on for an extensive addition to their works. The trenches were thoroughly saturated with water, and the ground practically impassable from the same cause—a very difficult site to properly drain, and showing a very poor prospect of proper drainage. The sewer consists of an eight-inch terra cotta pipe, not properly grounded, badly broken and discharging sewage over the ground at several points along its short line to windward, and discharging into standing pools and under-brush much too near the mills and other human habitations for health or comfort. From a careful inspection and test of the pipe, I judge it to be discarded, gathered together, patched up in the laying and put upon the company as good, merchantable sewer pipe without inspection. It is burned to a black crisp, rotten and wholly inefficient, and it should be replaced with merchantable sewer drain tile, laid deeper in the ground, extended to a point from which the prevailing southwest winds will not return the odors to plague the mill operatives or dwellers along the line, and the bed and banks of the run at its mouth kept clear and free from grass, weeds and shrubbery.

I have mentioned the excavation going on at this mill only in the hope that the owners may accept timely notice and look after the preparation of what I understand to be a ground, or basement floor, for a large number of mill operatives. It seems to greatly need looking after.

I am, very respectfully,

Your obedient servant,

A. W. SHAFFER,
Sanitary Engineer.

I concur in the above.

RICH'D H. LEWIS, M. D.,
Secretary.

Transmitted to Dr. J. M. Manning, Superintendent of Health of Durham County.

MALARIA.

Since the last report no special work has been done on this line, but evidence continues to accumulate that the distribution of the health pamphlet on Drinking Water in its Relation to Malarial Diseases throughout our Eastern Counties has brought about a gratifying improvement in the private water supplies, and, likewise, a diminution in malarial diseases.

In compliance with a request from Dr. W. R. Goley, Superintendent of Health of Alamance County, to assist him in ascertaining the cause of the serious outbreak of malarial diseases among the operatives of the Virginia Cotton Mills of Swepsonville, I visited that settlement with him and, after due consideration, came to the conclusions set forth in the following letter:

RALEIGH, October 5, 1898.

*Dr. W. R. Goley, Superintendent of Health Alamance County,
Graham, N. C.*

MY DEAR DOCTOR:—In fulfilment of the promise made to you on my recent visit with you to Swepsonville for the purpose of ascertaining, if possible, the cause of the unusual prevalence of malarial fevers in that village for the past two seasons to send you a written report of my views on the subject, I beg leave to submit:

The facts, as I understood them from you and Mr. Cook, the Superintendent of the Virginia Cotton Mill, are: Malarial fever was practically unknown in the village prior to two years ago. For the three past summers it has prevailed, particularly so this season. The dam across the river making a pond has been in existence for more than twenty years. Three years ago the dam was raised between two and three feet. The transportation business of the mill is done by means of flat boats on the river to Haw River station—four miles. About two years ago the Southern Railway began running through trains, both passenger and freight, to Norfolk. Mosquitoes have been more abundant for the past two years, notably so this season, the frequent rains and high temperature in August being favorable to their development. Malarial fevers are not restricted to Swepsonville, but are widely scattered over the county. The water supply of the village—from wells on high hills and pro-

tected from surface contamination—can not be infected, and I exclude that as a possible cause. The mill pond is situated to the northwest of the village. Its banks are for the most part steep. The amount of low-lying land—all on the far side from the village—in the immediate vicinity, at any rate, is small—only a few acres. The first chill this season occurred in the family living nearest the pond, the second in the family of the Superintendent of the mill on the top of a high hill in the middle of the village—subsequently practically in every family.

Having stated the conditions, I will attempt to suggest the most probable cause. I wish to say, however, in the outset, that malaria is a very mysterious poison in its behaviour, and in the present state of medical opinion we are not able to say with certainty whence it cometh, nor how it travelth. We know that it is associated with low, wet, marshy sections, and that it is usually found along water courses in the rolling country. We also know (I think I may safely say we know) that the protozoon known as *plasmodium malarie*, a blood parasite, is the cause of the diseases denominated malarial. It has also been demonstrated that this germ is found in mosquitoes, as well as in the red corpuscles of human blood. The old view that the malarial poison was a gas, marsh miasm, has been abandoned, but the transportation of the poison through the air is still held, though not so firmly nor universally as formerly.

The transmission through surface drinking-water has a great many facts to support it, and is largely accepted. But the latest, and to my mind the most satisfactory theory, is that it is carried by the mosquito. Believing the poison to be the *plasmodium*, a ponderable animalcule residing in water or certainly moist places, I can not believe that it can be gotten up from its bed to which it clings, into the air currents, as dry dust is, but it is easy to understand that it can be carried through the air as a passenger on or in a mosquito. As the female mosquito, after laying her eggs on the surface of stagnant water dies, sinks to the bottom, and there disintegrates, thereby setting free the contained plasmodia, the manner of the infection of drinking water is plain, it seems to me, although Koch, the greatest of the bacteriologists, says that it is not transmitted through the medium of water. For facts in support of the view that it is transmitted through drinking water, I would refer you to my pamphlet on *Drinking Water in its Relation to Malarial Diseases*. But Koch, the great master of science, and, therefore, one who carefully weighs his words, goes further, and as the result of his recent studies of malaria in German East Africa declares, without any qualification whatever, that it is conveyed, not by air, nor by water, but by mosquitoes. Such a statement from such a man carries very great weight, particularly when the theory he endorses more completely meets the conditions than any other.

Owing to the disposition of people to reason *post hoc* instead of *propter hoc*, the favorite theory doubtless with the residents is that the raising of the dam caused the trouble. But I can not see how that could have materially changed the conditions as to wet banks. On the contrary, by covering more of the low-lying lands and forcing the water closer up to the foot of the hills there ought to be an improvement in that respect, and I can not believe that enlarging the pond had anything to do with it. Malaria has been unusually prevalent in the hill country during the present season, regardless of raising dams. We know, too, that mosquitoes have been very much more in evidence than is customary, and that there seems to be a certain proportion between their numbers and the prevalence of malarial diseases. Emin or Slatin Pasha, I am not sure which, while he did not suspect mosquitoes, thought that malaria was a thing which could be kept out by nets, and was very particular in his journeyings through Africa to have them put up around him every night, and it is said he never had a malarial attack. The people of Swepsonville have doubtless had mosquitoes prior to the last two years without suffering from malaria. Can it be that those mosquitoes were uninfected with the plasmodium, and that these containing the parasite were brought up from the coast in the cars? Or that mosquitoes from Stinking Creek, a few miles distant, where malaria, I was told, had prevailed for many years, were blown over? I don't know, of course, but it seems to me not impossible. The late Dr. Johnson, of this city, in his interesting book on malaria, mentions the widespread prevalence of malaria in 1847 and 1848 throughout a number of our hill counties, Warren, Granville, Person and others, where it had never been known before. He does not give any explanation of the fact, but can you think of a more plausible one than mosquitoes blown up from our malarial low country by an easterly gale? But I will not pursue the subject further, but conclude with the expression of opinion that, in view of all the facts, including the absolutely demonstrated fact that Texas fever in cattle, the cause of which is a blood parasite attacking the red corpuscles of the blood and, therefore, very similar to the plasmodium malarial, is transmitted by *ticks*, and by ticks alone, I believe it is mosquitoes.

Very truly yours,

RICH'D H. LEWIS,

Secretary.

HEALTH CONFERENCES WITH THE PEOPLE.

Two of these popular meetings have been held—one with the people of Goldsboro, on October 14, 1897, and one with the people of Winston-Salem on December 7, 1898.

GOLDSBORO.

As no stenographic report of the proceedings was made, they can not be given *in extenso*, but the following was the programme:

The Conference is intended to be between the members of the State Board of Health and the people. Its object is to interest the people in sanitary matters by explaining and impressing upon them the great importance to the individual and to the community of a strict observance of the laws of health. Its proceedings will, therefore, be not technical, but popular in character, and everyone present will be invited to participate therein, by taking part in the discussions and by asking questions, which the members of the Board will take pleasure in answering to the best of their ability.

As the enforcement of sanitary rules in the family is largely in the hands of the mistress of the household, the ladies are especially invited to attend.

Papers and addresses are promised on the following subjects:

Vaccination—How can it be Best Secured?—By Dr. George G. Thomas, of Wilmington, President of the Board.

Sanitation of Small Towns.—By Dr. W. H. Harrell, member of the Board.

*Bread.—By F. P. Venable, Ph. D., Professor of Chemistry in the University.

*The Air We Breathe.—By Dr. Richard H. Lewis, of Raleigh, Secretary of the Board.

*“Mental Healing, or Christian Science.”—By Dr. S. Westray Battle, of Asheville, member of the Board.

Typhoid Fever.—By Dr. John Whitehead, of Salisbury, member of the Board.

Demonstration of the Serum Diagnosis Test of Typhoid Fever.—By Prof. Richard H. Whitehead, M. D., of the Medical Department of the University.

The New Disinfectant—Formaldehyde.—By the President of the Board.

There will be a "Question Box," and persons in the audience too modest to speak out in meeting, can write them out and deposit them in the same for answer by some member of the Board. Opportunity will be given for this at the end of the discussion of each set subject.

The meetings will be held in the Opera House, at 10 a. m. and 8 p. m. There will be a business meeting of the Board at the Mayor's office at 3 p. m.

You are cordially invited to attend and bring your friends.

RICHARD H. LEWIS, M. D.,

Secretary.

N. B.—The subjects will not necessarily come up in the order in which they appear above.

Owing to sickness and other unavoidable causes only the numbers marked with an * were filled. The audience, in the day, was rather small, but at night it was larger, representative in character and much interested in the proceedings.

WINSTON-SALEM.

The following announcement and programme was thoroughly distributed beforehand:

For several years it has been the custom of the State Board of Health to hold annually in one of our larger cities or towns a meeting for the purpose of bringing directly to the attention of the people the subject of sanitation, or preventive medicine. The name given to these meetings, "Health Conference with the People," accurately describes their character. The State Board of Health meets with the people of the community for the mutual discussion of all questions included in the word Sanitation. It is particularly desired that the people should actively participate in the conduct of the meeting, asking questions about, and giving their own experience on any matters relating to health.

There are in every community some public-spirited individuals who are interested in general measures likely to improve the health and, in consequence, advance the prosperity of their town, such as water supply, sewerage, the disposal of garbage, or other more dangerous refuse, the control of contagious diseases, etc., but in our active, progressive "Twin City" there are, as is well known, many such valuable citizens. We confidently count upon the cordial cooperation of this class in making the meeting a success.

As the mistress of the household, owing to the absence at his business of the master, must practically be the health officer of the family, and as it is a beautiful fact in our American civilization that what the women really want they always get, it is the earnest wish of the Board that the ladies attend, both for their own good and for the influence we hope to have them exert on their husbands and sweethearts who are too often indifferent to these things.

But no one has influence in matters of this kind comparable to that of the family physician. He is the trusted adviser on all subjects in any way related to health, and his words have more effect than those of all others combined. We especially desire, therefore, the hearty cooperation and assistance of our medical friends.

This invitation is not limited to Winston-Salem, or Forsyth County, but any one interested from other sections of the State will be warmly welcomed.

The reader of this is requested to lend us the support of his or her presence and sympathy, and to induce others to do the same.

The meetings will be held in the Mayor's Court Room, Winston Municipal Building. There will be three sessions at 10 a. m., and 3 and 7.30 p. m.

Come and bring your friends.

RICH'D H. LEWIS, M. D.,
Secretary.

PROGRAMME.

The Best Methods of Dealing with Tuberculous Patients from a Sanitary Standpoint.—By George G. Thomas, M. D., of Wilmington, President of the Board.

Bovine Tuberculosis.—By Cooper Curtice, D. V. S., M. D., of Raleigh. Biologist and Veterinarian to the Agricultural and Mechanical College and the State Experiment Station.

Sanitation in Small Towns.—By W. H. Harrell, M. D., of Williamston, member of the Board.

Management of an Outbreak of Small-pox in a North Carolina Community.—By H. F. Long, M. D., of Statesville, Superintendent of Health of Iredell County.

Small pox and Vaccination for Plain People.—By one of them—Col. A. W. Shaffer, C. E., of Raleigh, member of Board.

Water-borne Diseases.—By John Whitehead, M. D., of Salisbury, member of the Board.

Baths: A Plea for their More General Use in the Household.—By S. Westray Battle, M. D., of Asheville, member of the Board.

Drinking Water in its Relation to Health.—By J. L. Ludlow, C. E., of Winston, ex member of the Board.

Diphtheria: Its Prevention and Treatment.—By Passed Assistant Surgeon J. J. Kinyoun, United States Marine Hospital Service.

Report on the Use of Diphtheria Antitoxine.—By H. F. Long, M. D., of Statesville.

Germes.—By Richard H. Lewis, M. D., of Raleigh, Secretary of the Board.

N. B.—Persons in the audience desiring to do so are earnestly requested to ask questions or propound new subjects for discussion *at any time* and not to be afraid of interfering with the regular programme. A real Conference is what the Board wishes.

Several who were down for papers could not attend, but there was abundance of material. The proceedings are appended.

REPORT OF PROCEEDINGS OF THE HEALTH
CONFERENCE OF THE STATE BOARD OF
HEALTH WITH THE PEOPLE, AT WINSTON-
SALEM, DECEMBER 7, 1898.

MORNING SESSION.

The Conference of the State Board of Health was opened at 10 o'clock Wednesday, December 7, by Prof. J. J. Blair, Superintendent Winston City Schools, who said:

"Ladies and gentlemen: It is not out of place for a school man to take part in this meeting of medical men, for the work of both is largely of an educational nature. The germ that you would instil into the life of a nation you must introduce into the schools. I wish every school man could be here and take part in this meeting. I think it would result in great good and larger improvements in the schools, as well as in the homes, and better education in regard to sanitary systems. I wish there were more school men here. I see men of different occupations here; there are doctors and visitors, and they are in the best place they could be.

"You can legislate morals into a community, but you can not legislate improvements in sanitary conditions—for instance, you can not legislate clean streets and better conditions of health into the homes. You have all seen North Carolina on wheels. I think it would be a good plan to put this body on wheels and send it throughout the State, from one end to the other, and it would result in great good."

Mr. Blair told of an article he had read in a newspaper about what appeared to be a very thrilling and exciting account of a fire at sea. It described very graphically the way in which the men worked and fought against the fire, and pointed out that if we desired to keep our bodies healthy, we should also work and fight disease, etc. He then introduced Dr. Battle who, in the absence of the President, would preside.

Dr. Battle said:

"Ladies and gentlemen, I am very glad to be here, and very much obliged for the words Mr. Blair has said. The Secretary of the Board, Dr. Lewis, will explain the object of the meetings."

Dr. Lewis: "If you have read the announcement, there is very

little to say in regard to the object of these meetings. They are for discussing matters relating to public health and the best means of preventing disease. It is a conference of the State Board of Health *with the people*, the members and their friends, for in this meeting we will be assisted by friends who are not members of the Board. If anyone in the audience would like to ask a question, at any time, we should be glad to have him ask it, and, though we are perhaps not experienced enough to make you an absolute promise to answer every one satisfactorily still we will do the best we can. If any one in the audience is too modest to ask a question, he or she can write it on a slip of paper and send it to the President, and he or some member of the Board will answer it. We would also have you introduce and take up any subject, and if you have information which you feel like giving, we shall be glad to hear it. What we want is a general exchange of ideas, and if we can get up a warm discussion on any subject, so much the better. As you see by the programme, some of the members have prepared papers on several of the most interesting subjects, so there will certainly be something to talk about."

Dr. Lewis then invited the audience to come forward so as to be nearer the platform and better able to hear, after which he continued.

"Dr. George G. Thomas's paper on 'The Best Methods of Dealing with Tuberculous Patients from a Sanitary Standpoint.' I very much regret to say, can not be given us on account of the absence of Dr. Thomas. It is a great loss on this occasion, and we are all extremely sorry he is not here. That paper was put first on the programme, because he is President of the Board, and because tuberculosis is the most important of all diseases and his paper would have well begun the subject. It was to be followed by the subsidiary paper on "Bovine Tuberculosis," by Dr. Cooper Curtice, who is Veterinarian to the State Experiment Station, and who has had much experience along the line of this subject. After the Doctor has read his paper and introduced the general subject, although it will be beginning at the wrong end, I am sure the Chairman, Dr. Battle, who has had a large experience with this dread disease, will have something to say, and I hope our friends in general will take part in the discussion."

Dr. Curtice then rose and said:

"In this great battle against tuberculosis, which is now going on throughout the country (I might say the world), Dr. Lewis has correctly expressed the state of affairs when he said we are beginning at the wrong end of the subject. If we can put the whole battle in the right light, showing the method by which tuberculosis in cattle can be exterminated, we may gain a great deal of knowledge

with regard to the human form. Before reading this paper, I may say I have the disadvantage of speaking before a board of physicians, who would naturally expect that pathological terms should be used in speaking on the subject of Bovine Tuberculosis. I hope my paper is such that everyone, whether a medical man or not, may understand it."

Dr. Curtice's address on "Bovine Tuberculosis" was then read.

In the course of his address, Dr. Curtice said that it had just occurred to him to mention a talk he had with Dr. Moore, of New York. Dr. Moore had said: "In speaking of tuberculosis, we are talking as if it were a disease. We should talk more as if it were a parasite. In sufficient numbers it may cause a local disease, but not a systematic disease."

After a request on the part of the presiding officer for any questions, Dr. H. T. Bahnson, of Salem, said:

"There is one little point I would like to bring up. There is a very erroneous idea on the part of many mothers who have to get milk from cows, that only the milk from one cow, and that cow stall-fed, is suitable for a nursing baby. The point I would like to ask is this: Years ago I studied the matter very thoroughly, and I came to the conclusion that no cow could possibly be healthy in the atmosphere of a stable, and that the cow would be more susceptible to disease from being shut up in a stable. In other words, the healthy cow, the good cow, is the one that grazes on good pasture (I don't mean one that has to run ten or twelve miles to get a bite of grass but one that has a good pasture), and that has air and sunshine in plenty. I would like the doctor to say a word on the subject of stall-fed cows. I think that until the people refuse to buy any milk from a dairyman in whose cows there is a suspicion of tuberculosis, and until they refuse to believe in the old stalling plan, there will be sickness and disease."

Dr. Curtice: "The proposition involves two question: one the general health of the animal, and the other in regard to tuberculous cattle. We will never regret to put more air, more water and more sunshine in our stables, but also keep these cows in the stable. Where there is suspicion of tuberculosis, the cow must be kept in the stable, and away from other cows. * * * If you get five cows and suspect the health of one cow, you get the best active properties of the five cows, but I say get a good, healthy cow, get five good healthy cows and the danger is small. * * * If this city would require all dairymen to take out a license to sell milk, and then if it would use this money to pay an expert to examine the milk sold, and make investigations as to the sanitary conditions of the stables, at first it would not be necessary to go so far as the tuberculin test. If this expert would go around and examine the

stables and see that they were kept in good condition, and then inspect the cows, and if he saw the signs of any disease on the udder that would indicate that this cow was diseased, and that the animal probably had tuberculosis, if we then go to the dairyman and say to him, "Now you have such and such cows that are dangerous to the public health. We don't want to attack you publicly, because we believe that if you will take the necessary precautions it will be all right, but if you don't do it, then we will make the matter public, and as soon as the public knows that you have such a cow, they will no longer buy from you." I think this would do much to eradicate this disease in cattle and prevent its spread.

He then invited Dr. Battle to say something on the subject, remarking that Dr. Battle was too modest a man, and had to be dragged out.

Dr. Battle: After saying that the doctor was right about his modesty in facing such a meeting, Dr. Battle continued: "There is one little point that strikes us that we might touch upon, viz: the transmission of the tuberculine poison from cattle to the human being." Dr. Battle made a short talk on the subject, after which a general discussion followed.

Dr. Lewis expressed his regret at the absence of Dr. W. H. Harrell, of Williamston, who was to have read a paper on the subject, "Sanitation in Small Towns," and said that the cart had again been put before the horse, and that the address "Small-pox and Vaccination for Plain People," by Col. A. W. Shaffer, of Raleigh, should have preceded, on the programme, the address which Dr. Long, of Statesville was to have read. He then introduced Col. Shaffer, who read a paper on "Small-pox and Vaccination for Plain People," by One of Them.

Dr. Lewis explained that, on account of the absence of Dr. Long, of Statesville, his address on "Management of an Outbreak of Small-pox in a North Carolina Community" could not be given, but that Dr. Long's partner, Dr. Campbell, was with us, and would give us a few words on this subject:

DR. CAMPBELL'S ADDRESS.

"I think we stopped the spread of the disease in our county of Iredell, and its further spread not only in our county, but the surrounding counties, more, by vaccination than in any other way. I think that the isolation of all of the patients who would have been exposed to this disease is the only right course. In Iredell, the disease was upon us, and a number of cases were discovered. I think ten cases were discovered within ten days. These cases were in negro communities. These cases were discovered about the middle of the week, and by Sunday every negro in the community knew that

these people were sick. At one place where we went we found, I think, about twenty-five people, twelve of whom were suspected of having small-pox. Out of the number of suspects, at the time I speak, four cases had small-pox, though they were vaccinated. Everyone who had been exposed was vaccinated. * * * But I would say that vaccination in itself is not all that is necessary. It should be necessary also to isolate all possible suspects. Mere vaccination is well enough if taken in time, but it is not always a preventive if taken after exposure to the disease. This was illustrated by the experience we had in the small-pox camp in Statesville. Within the town and county we had, I think, sixty-four cases of small-pox: there were fifteen white, and the others were colored. Wherever a case was found, it was immediately put in quarantine, and all suspects were kept in the house and vaccinated."

Dr. Campbell then put in a plea for compulsory vaccination, and said that, as there was an absolute preventive for this dread disease in vaccination, there should be more stringent laws passed on the matter, and that all the experience he has had simply points to the fact that vaccination should be made compulsory. He said that less than five cases broke out after they had had the patients and suspects isolated.

Continuing his address, Dr. Campbell said:

"While upon this point, I don't know whether Dr. Lewis and the other physicians have had similar experiences to the one I had. It was with regard to the kind of virus used. There were about 7,000 vaccinations made in Iredell County: over 3,000 were made with points, and generally these points gave very poor results. I don't mean that they did not have the desired effect, but the result to the arms was bad. I think within our practice fifteen or twenty cases had sore arms, and in one case there was a sore in the arm through which I could run my hand. In a number of cases, fifteen weeks after vaccination, the arm would be sore. But in the case of the tubes, which we bought, I think, from a firm in Milwaukee, Wis., there were very few bad results."

Dr. Lewis: "I thank Dr. Campbell for his talk, but I would like to object to one thing the doctor carelessly said, thinking he was speaking to an assembly of medical men on the subject of sore arms."

Dr. Campbell: "I said that the vaccine tubes gave universal satisfaction and no bad arms."

Dr. Lewis then explained that some people were loth to be vaccinated on account of the sore arms sometimes resulting, but said that there was really little danger from vaccination, provided that it was performed right by a skillful physician and provided the body and blood were in proper condition, and he hoped nobody would let himself be scared by the little incident Dr. Campbell had cited.

Dr. Lewis then said that the meetings would be continued at 3 o'clock and at 7:30, when they hoped they should have an address by Dr. J. J. Kinyoun, of Washington. Passed Assistant Surgeon U. S. Marine Hospital Service, and that the principal subject would be diphtheria and the antitoxine treatment.

The meeting then adjourned till 3 p. m.

AFTERNOON SESSION.

The meeting was opened by the President, who announced that Dr. Kinyoun, of Washington, had agreed to say a word on the subject of needless sore arms resulting from vaccination.

Dr. Kinyoun: "In regard to the subject under discussion, that of sore arms as the result of vaccination, I may say that one bad arm as the result of vaccination has caused more trouble in small-pox than any one factor, and it is very hard to remove the prejudice in the minds of people when a case or instance of this character has been brought to their attention. You may talk scientifically as much as you please, after the damage is done you do not remove the prejudice. The only thing to do is to impress on the minds of the people the efficacy of vaccination and enlighten them as to the facts, and the only way that this can be done quickly and thoroughly is to prevent, so far as possible, this sad instance. Small-pox is more of a menace to the Southern people than to the Northern people—I mean by that to Southern white people. The statistics, which have been given by various boards of health show that vaccination in the Southern part of the United States is practiced but little, and only in places of large population. It is not practiced constantly, but only when there is a greater danger coming upon them. Now this is wrong. You know that, after a certain number of days, say $3\frac{1}{2}$ to 4, after the exposure of the person to small-pox, vaccination does not relieve the trouble. This instance alone will show the danger of waiting until the small-pox is in the community before you are vaccinated. You can not tell when you are exposed to small-pox, as the disease can be carried in the clothes of a person who has been in contact with a case. We all know the tendency of recovered people, how careless they are, especially in the way of sanitary surroundings, and it is so easy for the small-pox to be disseminated among the people. So long as we have ignorance and carelessness among us, so long will we have small-pox among us. We can not change this in a day—no, nor in ten—and the only thing to do for our protection is to have frequent vaccination. It has been my custom, when going into contact with cases of small-pox, as a precaution, to vaccinate myself. In a period of thirty years, vaccination has taken upon me three times, showing that during that time I have been

susceptible at least three times to an attack of small-pox. As said before, one case of a bad arm from vaccination will do more harm than any other factor in the management of small-pox. You would have naturally a fear to expose yourself, and especially your children, to a process which perhaps would bring about this result. Now, it is well to bear in your minds that this is not a regular result of vaccination, and that it is not necessarily a result of vaccination at all. We know, and our own experience tells us, how in one instance a mere scratch will bring up an inflammation, very serious, while in another instance the disaster is only passing and local. The explanation of this is, first, that the germs which cause inflammation, which cause ulceration, which cause gangrene, etc., are not ————. The second is that they keep pressing up in us small ———— and that the ———— forces of the body are able to exhaust them and bring a recovery. Now we find that the virus of small-pox * * * does not contain germs in ————, and since it does not contain germs that the circulation the ordinary way. * * * This can only be avoided by using virus lymph in all cases."

Dr. Kinyoun then explained that in his experience it was better to use the tubes in preference to the points, although the dealers liked better to sell the points, as less time and trouble were needed in their preparation, while, in the case of the tubes, it often took about ten days to prepare the virus and seal the tubes, but that it always gave better results. He then continued:

"Now you can produce inflammation with the lymph, provided the doctor is careless and the patient does not do what is told him. If the skin of the arm is thoroughly cleansed by some antiseptic, such as peroxide of hydrogen, the danger will be reduced to a minimum. Out of over 100,000 vaccinations with the virus lymph last winter in the States of Mississippi, Alabama and Georgia, we have not yet to record one bad result from the process. This ought to be sufficient. We have also the record of the New York City Board of Health, where they have used the virus lymph in preference to the points and these gave universal satisfaction. There have been two or three instances of bad arms, but usually attributable to the carelessness of the persons vaccinated.

In Germany the result is still more striking, because of the fact that, for the last fifteen years, vaccination has been made compulsory in many of the German states. They have regular vaccination days, which are usually the first of May, when the mothers bring their children to be vaccinated before they can enter school. Usually whole families come. For ten years the virus lymph has been used, and for ten years there has been no bad result, so far as we know, from the use of the lymph. There have been results where the lymph has not been used, but the virus taken direct from the animal and transferred.

The efficacy of vaccination is perhaps better shown in the statistics of the German reports than in any other way. There are something like 47,000,000 people in Germany to-day. Three years ago there were twelve cases of small pox; last year there was one case in 47,000,000 of people. There vaccination is compulsory. Not only that, but every able-bodied citizen must serve his time in the army. First, they are vaccinated when children; second, before entering school; and third, they are vaccinated before entering the army, making three vaccinations in all. We can not claim such statistics for our own country.

I think it is a duty that we, as citizens, owe, not only to ourselves, but to our children, to take the necessary precautions to prevent this disease. While it is impossible by the Constitution for the United States to make this compulsory, I believe that every State should make this one thing compulsory. I am sure that if the vaccination is performed properly (there is no case in surgery but demands care on the part of the physician) it would be all right, and we, as physicians, should require our patients to conform to the necessary conditions, and especially in the matter of sanitation. As I said before, prejudice is still in the minds of the people, and ignorance will be so strong that it will take years to eradicate it. * * * * Certainly, it is more than important that we, as Southern people, should have general vaccination.

In reply to the question, "At what age is it best to vaccinate?" Dr. Kinyoun replied:

"I should say about six months. Under six months it is not very well to vaccinate, but about six months is the most convenient age for vaccination. I was sent, about two years ago, to * * * * to look after small-pox in the mission, and there were about 4,000 cases, round about the streets everywhere. I vaccinated myself with virus lymph and waited four days. I was just on the point of vaccinating myself again, for my arm was not sore, I had no fever, etc., when a beautiful vesicle commenced to form, but I had no fever and there were no other bad results. Coming from a small pox place like that, I thought it best to vaccinate my family, which I did. I had a little fellow then only one year old. I vaccinated him, and expected there would be some trouble, but there were no bad results. no fever, etc., although the vaccination scar was as big as a five-cent piece."

Dr. Lewis then jocularly called attention to the fact that small pox, being worse in winter than in any other season, we should be especially careful lest we get the small pox as a Christmas gift.

The President then introduced Mr. J. L. Ludlow, C. E., of Winston, ex-member of the Board, who read a paper on "Drinking Water in Its Relation to Health."

After the conclusion of Mr. Ludlow's address, the President invited discussion, and one of the audience asked about snails in wells. She

cited an example of a family she knew who were always sick and said that it was thought that the sickness was caused by the fact that there were snails in the well.

Dr. Lewis: "In regard to this particular family, what was the nature of the sickness?"

"Fever, sore throat and pretty much everything."

Dr. Lewis: "Typhoid?"

"I am not sure whether they had typhoid or not."

Dr. Lewis: "They are a great inconvenience, but, as to making the water absolutely dangerous, I don't know about that. Of course, no one likes to drink water in which there are snails, but in order to give you a disease there must be the germ of that disease in the water. In other words, you may have very poor water, chemically speaking, that has not the typhoid fever germ in it. You can drink the water and never have typhoid fever. You may have another water supply which is chemically pure and is clear and sparkling, in other words, apparently the ideal water, that has the typhoid fever germ but no other impurities. That water is deadly. Mr. Ludlow has made reference to Plymouth. In our Board it is understood that the man who mentions Plymouth will be taken out and killed, but this audience is not composed of physicians, and there may be some here who have not heard about that epidemic."

Mr. Ludlow: "That is the reason I ventured to mention it."

Dr. Lewis: "This Plymouth, in Pennsylvania, was near a beautiful little mountain stream with a wooded water shed having only two small houses on it, clear and sparkling, typical water, which furnished the supply to the inhabitants. In winter this stream froze over and the people drank the water from the Susquehanna River. About the middle of February a man came to one of these cabins who had typhoid fever at the time, and the dejections were thrown out on the snow. The water was not used from the mountain stream because it was frozen up, and the water from the Susquehanna was. On the 26th day of March a thaw came, which melted the snow on the water shed and the ice in the stream so that the people again drank from it. On the 10th day of March, just the incubative period, the time it takes the germ to hatch, the fever broke out, and in three months 1,000 cases of typhoid fever occurred. The question was, did it come from this stream? Upon investigation this beautiful, chemically pure water was found to contain the typhoid fever germ. And every person who had drunk from this water had the fever, while those who had drunk from their foul wells, or the Susquehanna, only three miles below Wilkesbarre, with its 30,000 people, did not have the fever. * * * A case of typhoid fever is liable to break out at any time, if the law in regard to the disinfection of the dejections is not carried out. Unfortunately, I am sorry to say, the medical profession is largely to blame. If the family

physician would call attention to the absolute necessity of taking these precautions to prevent the spread of disease, and see that his orders are carried out, there would be less of the disease. I think a great deal of the trouble is owing less to the public water supplies than to the wells. So much dirt and filth can get into a well, and I want to put myself on record as being in favor of the public water supply as against the well. A man's dearest possession (next to his wife and children) is his well water. Every man is certain he has the best water in town, and we are going to get ourselves into trouble if we dispute it, and it is hard to convince him that the water is dangerous. A great many people will hold on to well water. The trouble is a person will say: 'My father drank from this well and my grandfather, and we never had a case of typhoid in the family, and I reckon it's good enough for me.' He may drink of this water and never have typhoid fever and possibly enjoy the best of health, but simply by taking care that there can be no chance of human filth getting into the well. There should be allowed on the surface within 100 feet of the well nothing that could possibly make the water impure. The filth lies on the surface, a rain comes and carries it through the soil into the well, the germs get into the well, and when there increase with the greatest rapidity."

Dr. Battle: "I want to say just a word in justice to the Winston water supply. It has not been shown up as well as it ought to have been. The Winston water supply here we regard as very good and chemical analysis shows it to be pure water, and the bacteriological examination shows it to have many bacteria, but they are all benign. The reason that the Winston water shows so many is that the day the sample was taken there was a tremendous rain, and in consequence it was not packed in ice. The result was that by the time the water reached its destination they had increased greatly. The ice would have not killed the bacteria (no more than they were killed on the snow at Plymouth), but it would have kept them from growing, and it was on that account that the Winston water did not show up better."

Dr. Curtice was then invited to say something about snails, and accordingly said: "I have had some occasion to study snails and have found that they like pure water, living mostly on the cress or such clear water plants. They are also scavengers. There is probably no disease that a snail can convey to a human being, but there is a disease that I have never seen reported from this country, which comes by water in which snails are, and that is flux. So in the question of disease from snails, the danger is only moderate."

Dr. Curtice then said that in going through Virginia and Tennessee, he had noticed many springs, that he had always noticed how these springs were situated and found that they were generally on hillsides. Dr. Curtice then went on to explain how the water filtered through the ground and between the rocks and into the spring, carrying with it particles of substances with which it came in contact.

Dr. Lewis: "I have had some experience with snails in wells, and the explanation of the odor I find to be due to the bodies of the dead snails. I don't think that the odor comes from vegetable matter."

The question was asked: "How often should you have a well cleaned?"

"If I were living here I would not have any well. I would fill mine up. I think, though, that a well ought to be cleaned out once a year, but if necessary, you have to keep cleaning it out. I once had a well that I had to clean out two or three times, and then it got too much for me and I was obliged to discontinue the use of it. But I think, generally, once a year is plenty."

Question: "How about boiling water?"

"That makes it perfectly safe. Boiling kills the germs and causes the mechanical impurities to settle, but it gives the water a flat taste. The greatest objection to boiled water is its unpalatable taste, but if it is agitated it becomes aerated and gets its life back again."

Dr. Lewis then expressed his regret at the absence of three of the members of the Board, viz, Dr. George C. Thomas, of Wilmington, President of the Board; Dr. W. Harrell, of Williamson, and Dr. John Whitehead, of Salisbury.

The meeting then adjourned to 7.30 p. m.

NIGHT SESSION.

Dr. Lewis apologized for his tardiness by saying it was due to the hospitality of some of the citizens, and then called on Dr. S. Westray Battle to begin the meeting.

Dr. Battle said: "Ladies and gentlemen, my subject is no reflection on the good people of Winston. In fact, since I came here, I have found that you have a very good system of baths. Mr. Hicks, Secretary of the Y. M. C. A., took me through the Association rooms and gave me some information. He tells me that there are over 500 members; that there are possibly taken about 10,000 baths every year, or about 30 a day—a very good showing indeed. I only wish that some enterprising person would start a public bath system here."

Dr. Battle then read his paper on Baths, a plea for their more general use in the household.

After the conclusion of Dr. Battle's address, the Secretary of the Y. M. C. A. was asked to distribute some slips of paper, in order to give any one in the audience who was too modest to ask a question an opportunity to write it and send it to the President.

Dr. Battle then introduced Dr. Kinyoun, of the U. S. Marine Hospital Service, who read a paper on "Diphtheria: Its Prevention and Treatment."

In response to an invitation for a general discussion, Dr. Kinyoun and Dr. Campbell more fully discussed the antitoxine treatment.

This was followed by a talk by Dr. Richard H. Lewis, of Raleigh, on "Germ."

After expression of thanks for courtesies received from the Y. M. C. A., the newspapers and the people of the Twin City, the meeting adjourned *sine die*.

VITAL STATISTICS.

As heretofore, owing to the conditions prevailing in our State, our vital statistics continue meagre, although the population from which they are drawn is larger by about 30 per cent than it was in 1896. In 1897 twenty cities and towns with an aggregate population of 138,153, of whom 79,178 were white and 58,975 were colored, reported reliably. In 1898 the numbers were respectively twenty-five, 164,088, 92,448 and 71,640. The total death rate in 1897 was 15.09: white, 11.06; colored, 20.05. In 1898, total 14.74: white 11.30; colored, 19.16. We observe the same peculiarities in the relative death rate among white and colored. The general death rate among the negroes is from eight to ten per thousand more than among the whites, and this proportion continues quite constant; and so does the proportional death rate from tuberculosis. In 1897 it was 1 white to 3.35 colored; in 1898 1 to 2.4, which was an absolute improvement, as the death rate from tuberculosis among the whites was a trifle lower in '98 than in '97. To be exact, the proportion of deaths from tuberculosis as compared with deaths from other causes was, in '97, for the whites, 1 in 9.6; for the colored, 1 in 5.9; in '98, 1 in 9.8, and 1 in 7, respectively. Or, to put it another way, the ratio of deaths from tuberculosis to the population in '97 is, for the whites, 1 in 870; colored, 1 in 289; in '98, 1 in 877 and 1 in 363.

We note again the much larger death rate from malarial diseases among the negroes, the ratio being in '97 as 139 to 363, and in '98, 248 to 596. This is probably due to lack of proper treatment and more insalubrious surroundings rather than to greater susceptibility. For further particulars the reader is referred to the tables which follow.

TABLE I.—SHOWING THE COMPARATIVE PREVALENCE OF CERTAIN DISEASES IN THE THREE PHYSICAL DIVISIONS OF THE STATE DURING 1897 AND 1898.

Eastern Division (E)—Alluvial Plains. Central Division (C)—Hilly. Western Division (W)—Mountainous. The figures under the various diseases represent in percentage the proportion of the counties reporting the presence of the disease in question to the whole number of counties sending reports for the month.

			Whole Number of Counties.	Number Coun- ties Reporting.	Diphtheria.	Diarrhoeal Diseases.	Influenza.	Malarial Fever.	Malarial Fever, Pernicious.	Malarial Fever, Hemorrhagic.	Pneumonia.	Scarlatina.	Typhoid Fever.
January.	E.	1897 1898	36	26 24	7.7 0.0	0.0 0.0	69.2 20.8	15.4 12.5	11.5 8.3	0.0 0.0	26.9 16.7	7.7 12.5	15.4 37.5
	C.	1897 1898	26	21 22	14.3 4.3	0.0 0.0	90.4 18.2	0.0 9.1	0.0 0.0	0.0 0.0	52.4 31.8	9.5 13.6	14.3 13.6
	W.	1897 1898	34	31 29	12.9 13.8	0.0 0.0	70.9 6.9	3.2 3.4	3.2 0.0	0.0 0.0	22.6 13.8	3.2 6.9	25.8 34.6
February.	E.	1897 1898	36	28 26	7.1 7.7	0.0 3.8	60.7 19.2	21.4 15.4	17.8 7.7	3.6 0.0	46.4 3.8	7.1 11.5	3.6 19.2
	C.	1897 1898	26	22 22	9.1 4.5	0.0 0.0	77.3 18.2	9.1 18.2	0.0 4.5	0.0 4.5	40.9 9.1	9.1 9.1	25.4 13.6
	W.	1897 1898	34	30 29	6.7 10.3	0.0 0.0	63.3 24.3	6.7 0.0	3.3 0.0	3.3 0.0	33.3 10.3	6.7 3.4	20.0 27.6
March.	E.	1897 1898	36	27 25	3.7 0.0	0.0 4.0	22.2 12.0	14.8 20.0	3.7 12.0	0.0 0.0	11.1 20.0	3.7 8.0	18.5 20.0
	C.	1897 1898	26	23 22	8.7 4.5	0.0 0.0	43.5 13.6	4.3 9.1	4.3 0.0	0.0 0.0	17.4 18.2	4.3 9.1	26.1 4.5
	W.	1897 1898	34	32 32	3.1 9.4	0.0 3.1	34.4 12.5	9.4 9.4	0.0 0.0	0.0 3.1	21.9 25.0	3.1 9.4	21.9 18.7
April.	E.	1897 1898	36	28 27	3.6 0.0	7.1 11.1	7.1 0.0	17.8 11.1	10.7 0.0	3.6 0.0	10.7 3.7	3.6 0.0	14.3 14.8
	C.	1897 1898	26	23 21	0.0 0.0	17.4 0.0	13.0 0.0	26.1 0.0	0.0 0.0	0.0 0.0	4.3 9.5	4.3 9.5	17.4 14.3
	W.	1897 1898	34	31 32	6.4 3.1	12.9 9.4	6.4 6.2	6.4 3.1	0.0 0.0	0.0 0.0	0.0 12.5	3.2 3.1	16.1 12.5
May.	E.	1897 1898	36	25 26	4.0 0.0	0.0 57.7	0.0 3.8	20.0 30.8	0.0 3.8	0.0 3.8	0.0 0.0	0.0 3.8	28.0 38.5
	C.	1897 1898	26	22 22	9.1 0.0	0.0 54.5	4.5 4.5	22.7 18.2	0.0 4.5	0.0 0.0	4.5 13.6	13.6 13.6	18.2 22.7
	W.	1897 1898	34	31 31	3.2 6.4	0.0 48.4	0.0 3.2	12.9 12.9	3.2 0.0	0.0 0.0	6.4 6.4	0.0 0.0	38.7 41.9
June.	E.	1897 1898	36	27 26	3.7 0.0	37.0 38.5	0.0 0.0	4.4 38.5	0.0 0.0	3.7 0.0	0.0 3.8	0.0 0.0	48.1 69.2
	C.	1897 1898	26	23 20	13.3 0.0	43.5 25.0	0.0 0.0	47.8 45.0	0.0 0.0	0.0 5.0	0.0 0.0	4.3 5.0	65.2 55.0
	W.	1897 1898	34	31 31	0.0 0.0	32.7 41.9	0.0 0.0	25.8 16.1	3.2 3.2	3.2 3.2	0.0 6.4	0.0 3.1	58.1 77.4
July.	E.	1897 1898	36	26 27	7.7 0.0	7.7 11.1	0.0 0.0	65.4 63.0	0.0 11.1	3.8 7.4	0.0 0.0	0.0 0.0	69.2 74.1

TABLE I—continued.

Averages for the Year.			Month.																					
			July.		August.		September.		October.		November.		December.											
			C.	1897 1898	W.	1897 1898	E.	1897 1898	C.	1897 1898	W.	1897 1898	E.	1897 1898	C.	1897 1898	W.	1897 1898	E.	1897 1898	C.	1897 1898	W.	1897 1898
Whole Number of Counties.	26	23 21	13.3 4.8	13.3 19.0	0.0 0.0	34.8 46.7	4.3 4.8	4.3 0.0	0.0 0.0	13.3 4.8	65.2 71.3													
	34	30 32	3.3 3.1	16.7 18.7	0.0 0.0	16.7 18.7	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	76.7 81.2													
	36	21 24	0.0 12.5	4.8 20.8	0.0 0.0	57.1 83.3	4.8 16.7	4.8 20.8	0.0 0.0	14.3 4.2	76.2 78.3													
	26	18 21	11.1 4.8	0.0 0.0	0.0 0.0	72.2 46.7	0.0 4.8	5.5 4.8	0.0 0.0	0.0 4.8	66.7 71.3													
Number Count- ies Reporting	34	30 31	10.0 12.9	0.0 6.4	0.0 0.0	23.3 9.7	0.0 0.0	0.0 0.0	0.0 0.0	3.3 3.2	83.3 87.1													
	36	22 23	13.6 13.3	13.6 0.0	0.0 0.0	72.7 87.0	40.9 21.7	31.8 30.4	0.0 0.0	4.5 8.7	77.3 69.6													
	26	22 22	18.2 9.1	4.5 0.0	0.0 0.0	50.0 59.1	4.5 4.5	9.1 9.1	0.0 0.0	22.7 4.5	72.7 50.0													
	34	30 32	23.3 31.2	0.0 0.0	0.0 0.0	20.0 18.7	0.0 3.1	0.0 0.0	0.0 0.0	10.0 3.1	73.3 78.1													
Diphtheria.	36	24 27	8.3 0.0	0.0 3.7	0.0 0.0	58.3 70.4	37.5 37.0	12.5 29.1	0.0 3.7	16.7 7.4	62.5 66.7													
	26	21 20	19.0 0.0	0.0 0.0	4.8 5.0	45.7 55.0	9.5 10.0	9.5 10.0	0.0 0.0	38.1 15.0	38.1 30.0													
	34	29 32	34.6 15.6	0.0 0.0	6.9 6.2	17.2 12.5	0.0 0.0	3.4 0.0	0.0 3.1	17.2 3.1	72.4 71.9													
	36	25 25	16.0 8.0	0.0 0.0	12.0 8.0	64.0 60.0	32.0 24.0	20.0 0.0	8.0 4.0	0.0 4.0	48.0 28.0													
Diarrhoeal Diseases.	26	22 22	18.2 9.1	0.0 0.0	9.1 9.1	22.7 18.2	18.2 0.0	0.0 0.0	13.6 18.2	22.7 18.2	22.7 45.4													
	34	30 30	26.7 16.7	0.0 0.0	6.7 6.7	3.3 6.7	0.0 0.0	0.0 0.0	10.0 16.7	10.0 3.3	60.0 60.0													
	36	24 25	0.0 0.0	0.0 0.0	25.0 20.0	50.0 40.0	29.2 0.0	0.0 24.0	20.8 12.0	4.2 4.0	50.0 60.0													
	26	22 22	9.1 9.1	0.0 0.0	25.4 40.9	4.5 9.1	0.0 0.0	0.0 0.0	4.5 22.7	36.4 4.5	18.2 9.1													
Influenza.	34	30 32	16.7 6.2	0.0 0.0	3.3 34.4	0.0 0.0	0.0 0.0	0.0 0.0	10.0 18.7	0.0 0.0	33.3 37.5													
	36	25.2 26	6.3 12.0	5.8 6.5	16.3 22.3	38.4 28.4	14.8 3.4	7.0 2.4	10.3 11.5	5.1 14.8	42.6 37.6													
	34	30.4 34	12.2 3.5	5.2 10.6	16.0 8.4	12.1 9.3	1.1 0.5	0.8 0.5	8.7 9.4	4.7 3.2	48.3 52.5													
	96	77.4 77.9	10.2 18.6	5.8 10.4	18.2 8.2	26.3 27.2	6.4 4.8	3.4 3.6	10.2 8.1	8.2 5.9	42.2 44.7													

TABLE II.—SHOWING THE COMPARATIVE PREVALENCE OF DISEASE DURING THE YEARS 1897 AND 1898.

DISEASES.	NUMBER OF COUNTIES WHICH MENTION THE PRESENCE OF EACH DISEASE EACH MONTH.											
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Number of counties sent in reports (96 counties in the State.)	1897... 78	80	82	82	78	81	79	69	74	74	77	77
	1898... 75	77	79	80	79	77	80	76	77	79	77	80
Bowel diseases, including dysentery	1897... 1	2	12	34	32	10	1	4	...	...	...	...
	1898... 1	2	6	42	27	12	7	...	1	...	...	...
Cholera (chicken)	1897... 1	...	1	2	2	3	1	1	1	1	...	...
	1898... 1	...	...	...	1	1	1	...	...	...	...	1
Cholera (hog)	1897... 5	...	1	3	4	5	1	3	4	2	2	5
	1898... 2	1	...	2	3	3	2	3	1	4	4	2
Diphtheria	1897... 9	6	4	3	4	4	6	5	14	16	16	7
	1898... 5	6	4	1	2	...	2	8	15	5	9	4
Distemper (in horses)	1897... 1	1	...	...	1	...	...	...	1	...	...	...
	1898... 2	1	3	1	1	1	...	...	...	...	...	...
Influenza	1897... 59	53	27	7	1	...	...	...	3	7	13	...
	1898... 11	16	10	2	3	...	...	...	3	6	25	...
Malarial fever	1897... 5	10	8	13	14	32	30	32	23	30	22	13
	1898... 6	6	10	4	16	24	33	35	39	34	21	13
Malarial fever, hemorrhagic	1897... 4	6	2	3	1	1	1	1	10	11	12	7
	1898... 2	3	3	...	2	1	4	5	7	12	6	6
Malarial fever, pernicious	1897... 2	...	1	...	2	2	2	9	6	5	...	...
	1898... 1	1	...	1	1	2	6	9	8	...	...	...
Measles	1897... 6	13	14	13	13	14	8	4	3	4	14	17
	1898... 28	37	27	25	20	8	9	3	1	3	3	3
Mumps	1897... 3	4	4	2	3	...	...	...	...	1	1	1
	1898... 3	2	4	5	3	...	...	...	1	1	1	...
Pneumonia	1897... 25	32	14	4	3	...	...	...	...	...	8	9
	1898... 15	12	17	7	2	3	...	...	...	2	10	14
Rabies (in dogs)	1897... 1	...	...	...	...	...	...	...	...	...	...	...
	1898... 1	...	...	...	...	1	...	...	...	1	...	...
Rötheln	1897... 2	1	1	...	1	...	1	...	...	...	...	...
	1898... 1	...	...	...	...	...	...	...	...	...	...	...
Scarlatina	1897... 5	6	3	3	3	1	3	4	9	17	8	9
	1898... 7	4	5	3	4	2	1	3	4	6	6	2

TABLE II.—SHOWING THE COMPARATIVE PREVALENCE OF DISEASE,
ETC.—*Continued.*

DISEASES.	NUMBER OF COUNTIES WHICH MENTION THE PRESENCE OF EACH DISEASE EACH MONTH												
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
Small-pox	{ 1897 ..	2	3	2	1	2	5	3	3	2	1	1	3
	{ 1898 ..	2	3	2	1	2	5	3	3	2	1	1	3
Typhoid fever	{ 1897 ..	15	13	18	13	23	46	57	53	56	45	36	25
	{ 1898 ..	22	16	12	11	28	53	60	61	53	47	35	29
Varicella	{ 1897 ..				1								3
	{ 1898 ..	6			3					1	1	1	
Whooping-cough	{ 1897 ..	14	17	19	16	21	25	25	9	13	14	15	11
	{ 1898 ..	11	21	16	16	13	12	17	15	9	5	8	7

TABLE NO. III.—TABLE OF MORTALITY REPORTS FOR YEAR ENDING DECEMBER 31, 1897—Continued.

TOWNS AND REPORTERS.	DEATHS BY MONTHS—1898.												DEATH-RATE (ANNUAL) PER 1,000, BY MONTHS.												RATE FOR YEAR.		POPULA- TION.					
	Races.												January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	By Races.	By Towns.		Total.				
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.																	Total by Races.	Grand Total.		
Raleigh	W	15	7	5	9	6	4	6	14	11	15	15	112	220	25	0	11	7	8	3	14	7	9	0	6	0	14	7	8,000			
T. P. Sule, Clerk B. of H.	C	9	9	11	9	13	5	11	8	8	8	9	108	185	18	0	18	0	22	0	18	0	13	0	13	0	18	0	7,000			
Rockingham	W	1	2	1	2	1	2	4	0	1	0	0	15	22	9	2	18	5	9	2	18	5	9	2	18	5	9	2	1,300			
Dr. W. H. Steele	C	0	1	0	1	0	3	0	0	0	1	1	7	0	0	2	7	0	0	80	0	0	0	0	0	0	0	12	6	450		
Dr. W. M. Fowkes																																
Rocky Mount	W	0	0	0	1	3	0	1	1	4	1	0	11	14	0	0	0	0	7	5	22	5	0	0	0	0	6	9	1,600			
Dr. G. L. Wimberley	C	0	2	0	0	0	0	0	0	1	0	0	3	0	24	0	0	0	0	0	0	12	0	0	0	0	3	0	1,000			
Salem	W	4	6	0	4	4	2	1	4	4	1	3	37	50	12	2	18	2	0	12	2	12	2	11	7	2	9	9	0	4,100		
S. C. Butler, Mayor	C	1	0	1	2	2	0	2	1	0	2	13	13	35	1	0	35	1	70	2	70	2	35	1	0	0	28	9	450			
Salisbury	W	2	5	4	3	11	2	7	1	4	6	5	54	112	6	8	17	1	14	0	12	0	9	0	33	0	6	0	4,000			
Dr. John Whitehead	C	9	5	3	9	2	4	7	1	6	4	0	58	72	0	40	0	24	0	72	0	16	0	32	0	6	0	38	7	1,500		
Scotland Neck	W	2	1	0	3	2	1	0	2	1	2	1	15	20	3	2	15	5	15	5	0	0	46	4	30	4	15	5	31	0	775	
J. A. Perry, Mayor	C	0	0	0	1	1	1	0	1	0	1	5	5	0	0	0	0	0	0	28	2	28	2	0	28	2	0	11	5	425		
Tarboro	W	2	1	0	0	1	1	1	3	0	2	12	25	20	0	10	0	0	10	0	10	0	10	0	30	0	0	0	10	0	1,200	
Dr. L. L. Slaton	C	2	3	2	0	0	0	2	2	0	1	13	18	18	5	27	7	18	5	0	0	0	18	5	0	0	9	2	1,300			
Washington	W	2	3	5	1	4	3	3	4	7	2	3	39	85	8	0	12	0	20	0	16	0	12	0	8	0	13	0	3,000			
Dr. Joshua Tayloe	C	2	4	6	2	4	4	5	4	1	5	4	46	9	6	19	2	28	0	9	6	19	2	24	0	19	2	18	4	2,500		
Dr. D. T. Tayloe																																
Weldon	W	1	2	0	0	0	1	0	0	2	2	2	10	25	17	1	34	3	0	0	0	17	1	0	0	0	34	3	31	3	700	
J. T. Gooch, Mayor	C	1	1	2	0	1	0	3	1	2	0	15	16	16	0	16	0	32	0	16	0	48	0	16	0	32	0	20	0	750		
Wilmington	W	11	15	8	9	7	16	15	15	18	16	16	164	147	20	0	10	7	12	0	9	3	21	3	20	0	21	6	18	2	10,000	
Dr. J. C. Shepard	C	28	32	20	27	35	26	37	33	36	31	18	359	25	8	29	5	18	5	24	9	32	3	24	0	34	1	30	5	28	8	15,000
Dr. W. D. McMillan																																

TABLE NO. IV.--TABLE OF MORTALITY REPORTS FOR YEAR ENDING DECEMBER 31, 1898.

TOWNS AND REPORTERS.	DEATHS BY MONTHS—1898.												DEATH RATE (ANNUAL) PER 1,000 BY MONTHS												RATE FOR YEAR.		POPULATION.			
																												By Races.	By Towns.	
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.						
Races.	Total by Races	Grand Total	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	By Races.	By Towns.	Total.													
Asheville	W. 16	5	6	3	8	10	10	7	15	10	11	8	109	241	24.0	7.5	9.0	4.5	12.0	15.0	15.0	22.7	15.0	16.5	12.0	13.6	8.5	8,000	13,000	
Dr. M. H. Fletcher	C. 14	11	6	10	15	12	10	14	9	11	11	13	132	33.6	26.4	14.4	24.0	36.0	28.8	24.0	33.3	21.6	21.6	26.4	26.4	26.4	26.4	5,000		
Charlotte	W. 6	9	11	7	22	16	9	17	5	13	13	15	143	305	4.2	6.3	7.7	4.8	15.9	11.2	6.3	11.9	3.5	9.1	10.5	8.3	11.7	17,153	26,153	
Dr. F. O. Hawley	C. 14	11	8	14	21	18	16	13	7	15	15	10	162	20.9	14.7	10.7	20.9	28.0	24.0	21.3	17.3	9.3	20.0	20.0	13.3	18.0	11.7	9,000		
Durham	W. 4	4	5	4	6	7	4	3	5	3	4	2	51	61	12.0	12.0	15.0	12.0	15.0	21.0	12.0	9.0	15.0	9.0	12.0	6.0	12.7	10.2	4,000	6,000
Dr. John M. Manning	C. 2	0	0	2	0	0	3	0	2	1	0	0	10	12.0	0.0	12.0	12.0	0.0	0.0	12.0	0.0	12.0	6.0	0.0	0.0	0.0	5.0	2,000		
Fayetteville	W. 3	1	2	1	3	4	6	3	0	5	2	2	32	82	9.0	3.4	6.8	3.4	10.3	13.7	20.6	10.3	0.0	17.1	6.8	6.8	9.1	13.7	3,500	6,000
Dr. J. V. McGowan	C. 1	6	1	8	1	4	4	8	8	3	5	1	50	4.8	28.9	4.8	38.4	4.8	19.2	19.2	38.4	38.4	14.4	24.0	4.8	20.0	20.0	2,500		
Goldshoro	W. 2	2	1	5	3	7	4	6	1	3	0	36	99	6.5	6.5	6.5	3.0	15.0	10.3	24.0	10.7	18.0	3.0	8.0	0.0	8.0	14.1	4,500	7,000	
T. H. Bain	C. 3	3	3	2	4	2	6	10	5	9	9	7	63	18.0	18.0	18.0	9.6	16.0	9.6	28.8	48.0	20.0	36.0	43.2	33.6	25.2	25.2	2,500		
D. J. Broadhurst, City Clerk.	W. 3	5	4	2	5	5	7	1	2	2	1	5	42	132	5.7	10.0	8.0	4.0	10.0	10.0	14.0	2.0	4.0	4.0	2.0	10.0	7.0	13.2	6,000	10,000
Greensboro	C. 6	4	8	4	13	9	2	19	6	4	3	12	90	18.0	12.0	24.0	12.0	39.0	27.0	6.0	57.0	18.0	12.0	9.0	36.0	22.5	22.5	4,000		
Henderson	W. 0	1	1	0	2	4	2	0	2	2	1	16	42	0.0	5.3	5.3	5.3	0.0	10.7	21.3	10.7	0.0	10.7	10.7	5.3	7.1	9.9	2,250	4,250	
Dr. F. R. Harris	C. 2	5	3	0	1	4	3	6	1	0	1	26	12.0	30.0	18.0	0.0	6.0	24.0	18.0	36.0	6.0	0.0	0.0	0.0	0.0	13.0	13.0	2,000		
Dr. Goode Creatham	W. 0	1	0	0	1	0	3	0	0	1	2	0	8	9	0.0	30.0	0.0	0.0	17.1	0.0	90.0	0.0	0.0	30.0	60.0	0.0	20.0	12.8	400	700
Hillsboro	C. 0	1	0	0	0	0	0	0	0	0	0	0	1	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	3.3	300		
Dr. C. D. Jones	W. 0	0	1	0	0	1	0	0	0	0	0	0	3	4	0.0	0.0	13.3	0.0	0.0	13.3	0.0	0.0	13.3	0.0	0.0	3.3	3.3	900	1,200	
Lenoir	C. 0	1	0	0	0	0	0	0	0	0	0	0	1	0.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	300		
Dr. A. A. Kent	W. 1	1	0	0	1	1	0	1	2	0	0	0	7	10	16.0	16.0	0.0	0.0	15.0	16.0	0.0	15.0	30.0	0.0	0.0	8.7	8.3	800	1,200	
Marion	C. 1	0	0	0	1	0	0	0	0	0	0	0	1	48.0	0.0	0.0	0.0	48.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	7.5	7.5	400		
Dr. B. A. Cheek	W. 1	0	0	0	1	0	0	0	0	0	0	0	1	48.0	0.0	0.0	0.0	48.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	7.5	7.5	400		

TABLE NO. IV.—TABLE OF MORTALITY REPORTS FOR YEAR ENDING DECEMBER 31, 1898—Continued.

TOWNS AND REPORTERS.	Races.	DEATHS BY MONTHS—1898												DEATH RATE (ANNUAL) PER 1,000 BY MONTHS.				RATE FOR YEAR.		POPULATION.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	By Races.	By Towns.					
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.							
Monroe	W	1	1	1	2	1	2	1	1	2	1	1	2	29	6.7	6.7	6.7	13.3	1,800	
Dr. J. M. Blair	C	1	0	1	1	1	2	1	1	1	1	1	1	13	20.0	0.0	20.0	21.7	600	
Newbern	W	1	3	3	4	5	6	7	5	5	1	4	1	45	3.4	10.3	13.7	12.8	3,500	
Hugh J. Lovick, City Clerk.	C	8	5	6	7	10	16	13	15	10	8	7	4	109	19.0	10.0	12.0	18.2	6,000	
Oxford	W	0	2	0	3	5	4	0	2	1	2	0	2	44	0.0	21.8	20.0	17.5	1,200	
Dr. G. A. Coggeshall.	C	1	1	1	3	4	1	3	3	3	1	2	3	23	10.9	10.9	10.9	20.9	1,100	
Raleigh	W	2	7	5	10	11	16	9	11	7	11	14	5	108	3.0	10.5	7.0	12.7	8,500	
T. P. Sale, Clk B'd of Health.	C	14	15	6	10	16	14	11	8	15	7	9	10	135	24.0	25.7	16.0	18.0	7,500	
Rockingham.	W	0	1	0	2	0	0	0	3	2	1	0	0	9	0.0	9.2	0.0	69.9	1,300	
Dr. W. M. Fowlkes	C	0	1	0	1	0	1	0	1	1	0	0	0	5	0.0	26.7	0.0	11.1	450	
Rocky Mount.	W	0	1	0	1	1	1	4	2	0	1	1	0	13	0.0	7.5	0.0	8.1	1,600	
Dr. G. L. Wimberly	C	0	2	0	0	3	1	0	1	0	1	0	0	8	0.0	24.0	0.0	8.0	1,000	
Salem.	W	3	5	2	6	3	1	0	2	4	1	5	3	34	8.8	15.0	5.9	8.3	4,100	
S. C. Butner, Mayor	C	0	0	0	1	2	0	1	2	0	0	0	0	6	0.0	0.0	0.0	13.3	450	
Salisbury	W	10	3	2	7	6	6	6	5	5	5	5	5	62	30.0	9.0	6.0	15.5	4,000	
Dr. John Whitehead	C	3	3	4	5	5	7	4	7	3	6	3	6	56	18.0	18.0	24.0	28.0	2,000	
Dr. W. L. Crump.																				
Scotland Neck.	W	2	1	0	1	1	1	0	3	0	1	1	1	11	30.9	15.5	15.0	14.1	775	
J. A. Perry, Mayor	C	0	0	1	0	1	1	1	1	0	0	0	0	5	0.0	0.0	28.2	11.8	425	
Tarboro.	W	2	1	5	1	2	1	0	0	0	0	1	1	14	20.0	10.0	10.0	11.7	1,200	
Dr. L. L. Staton	C	0	0	2	1	2	0	0	0	0	0	0	0	6	0.0	18.5	0.0	4.6	1,300	

TABLE NO. V.—SHOWING CAUSES OF DEATH FOR YEAR ENDING DECEMBER 31, 1897.

Towns.	Races.	POPULATION.		ANNUAL DEATH RATE PER 1,000.		Typhoid Fever.	Scarlet Fever.	Malarial Fever.	Diphtheria.	Whooping Cough.	Measles.	Pneumonia.	Consumption.	Brain Diseases.	Heart Diseases.	Neurotic Diseases.	Diarrhoeal Diseases.	All Other Diseases.	Accident.	Suicide.	Violence.	TOTAL DEATHS.		Deaths Under Five Years.	Still Born.
		By Races.	Total.	By Races.	Total.																	By Races.	By Towns.		
CHARLOTTE	{ White.	17,153	26,153	8.6	11.0	12	8	1	0	0	0	15	18	4	8	0	10	73	6	0	0	147	287	51	14
	{ Colored.	9,000		15.5		8	0	2	0	0	0	10	23	1	8	0	8	74	6	0	0	0	140	45	17
FAYETTEVILLE	{ White.	3,500	6,000	8.0	11.7	0	0	2	0	0	0	3	1	1	7	3	1	10	0	0	0	28	70	2	6
	{ Colored.	2,500		16.8		3	0	3	0	0	0	0	11	2	9	2	0	7	2	0	0	42	4	4	3
GOLDSBORO	{ White.	3,700	5,700	9.2	16.1	2	0	1	0	0	2	0	2	0	10	0	3	14	0	0	0	34	92	8	4
	{ Colored.	2,000		29.0		1	0	5	0	0	2	6	8	1	2	0	7	23	3	0	0	58	24	24	9
GREENSBORO	{ White.	6,000	10,000	8.2	14.5	4	0	1	0	1	0	5	8	4	1	1	4	20	0	0	0	49	145	15	8
	{ Colored.	4,000		24.0		2	0	2	0	14	0	8	16	10	8	0	8	28	0	0	0	96	46	8	8
HENDERSON	{ White.	2,250	4,250	9.8	10.1	0	0	2	0	0	0	0	4	3	2	0	4	7	0	0	0	22	43	5	1
	{ Colored.	2,000		10.5		2	0	0	0	0	0	0	6	1	1	0	0	10	1	0	0	0	21	0	0
HILLSBORO	{ White.	400	700	10.0	17.0	0	0	0	0	0	0	1	0	0	1	0	0	2	0	0	0	4	12	2	1
	{ Colored.	300		26.7		0	0	0	0	0	0	0	2	0	0	1	1	4	0	0	0	8	0	0	0
LENOIR	{ White.	800	1,100	5.0	8.2	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4	9	0	0
	{ Colored.	300		16.7		0	0	0	0	0	0	1	1	0	0	0	0	3	0	0	0	0	5	0	0
MONROE	{ White.	1,800	2,400	8.9	12.1	0	0	1	0	0	0	5	0	1	3	0	2	4	0	0	0	16	29	0	0
	{ Colored.	600		21.7		1	0	2	0	0	0	1	1	0	1	0	0	7	0	0	0	13	0	0	0
OXFORD	{ White.	1,200	2,300	12.5	17.8	1	0	0	0	0	0	4	6	2	1	0	1	9	0	0	0	15	41	4	1
	{ Colored.	1,100		23.6		0	0	0	0	0	1	4	0	3	1	0	1	11	0	0	0	26	10	10	6
RALEIGH	{ White.	8,000	15,000	14.0	14.7	1	0	1	3	2	0	13	9	11	13	1	23	35	0	0	0	112	220	32	13
	{ Colored.	7,000		15.4		2	0	0	0	1	0	9	26	9	4	2	9	44	2	0	0	108	33	33	25

TABLE NO. V.—SHOWING CAUSES OF DEATH FOR YEAR ENDING DECEMBER 31, 1897—Continued.

TOWNS.	Races.	POPULATION.		ANNUAL DEATH RATE PER 1,000.		Typhoid Fever.	Scarlet Fever.	Malarial Fever.	Diphtheria.	Whooping Cough.	Measles.	Pneumonia.	Consumption.	Brain Diseases.	Heart Diseases.	Neurotic Diseases.	Diarrheal Diseases.	All Other Diseases.	Accident.	Suicide.	Violence.	TOTAL DEATHS		Deaths Under Five Years.	Still Born.	
		By Races.	Total.	By Races.	Total.																	By Races.	By Towns.			
ROCKINGHAM	{ White. Colored.	1,300	1,750	11.5	12.6	3	0	1	0	0	0	0	0	1	1	0	0	2	7	0	0	0	15	22	1	0
		450		15.5		2	0	0	0	0	0	0	0	1	1	0	0	0	2	0	0	0	7	0	0	0
ROCKY MOUNT	{ White. Colored.	1,600	2,600	6.9	5.4	0	0	1	0	0	0	0	1	2	1	1	2	3	0	0	0	0	11	14	0	1
		1,000		3.0		0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	3	0	0	0
SALEM	{ White. Colored.	4,100	4,550	9.0	11.0	0	0	1	0	0	0	6	2	1	4	0	1	22	0	0	0	0	37	50	13	2
		450		28.9		0	0	0	0	0	0	0	2	0	0	1	1	0	9	0	0	0	13	4	1	0
SALISBURY	{ White. Colored.	4,000	5,500	13.5	20.4	8	0	0	0	0	0	6	4	5	3	0	11	17	0	0	0	0	54	112	14	1
		1,500		38.7		1	0	0	0	0	0	9	14	3	2	0	11	18	0	0	0	0	58	13	1	0
SCOTLAND NECK	{ White. Colored.	775	1,200	19.3	16.7	0	0	0	0	0	0	0	3	0	0	1	4	7	0	0	0	0	15	20	8	0
		425		11.5		0	0	0	0	0	0	0	0	0	0	1	0	1	2	1	0	0	5	2	0	0
TARBORO	{ White. Colored.	1,200	2,500	10.0	10.0	1	0	0	0	0	0	2	4	0	1	0	1	3	0	0	0	0	12	25	0	0
		1,300		10.0		1	0	0	0	0	0	0	1	0	1	0	0	10	0	0	0	0	13	0	0	0
WASHINGTON	{ White. Colored.	3,000	5,500	13.0	15.4	3	0	0	0	0	0	0	4	5	4	2	7	13	1	0	0	0	39	85	7	0
		2,500		18.4		2	0	1	0	0	0	0	6	6	2	5	3	9	12	0	0	0	46	14	0	0
WELDON	{ White. Colored.	700	1,450	14.3	17.2	1	0	0	0	0	0	1	0	1	0	0	0	7	0	0	0	0	10	25	1	0
		750		20.0		0	0	1	0	1	0	0	1	0	1	0	1	1	8	2	0	0	15	2	0	0
WILMINGTON	{ White. Colored.	10,000	25,000	16.4	20.9	3	0	6	0	2	0	8	17	13	3	1	14	89	6	1	1	1	164	523	39	8
		15,000		23.9		9	0	27	1	11	0	23	41	11	10	10	25	199	2	0	0	0	359	113	11	28
WILSON	{ White. Colored.	2,500	4,500	11.2	9.8	1	0	0	0	0	1	0	1	3	0	2	1	5	12	0	0	0	28	44	11	1
		2,000		8.0		0	0	1	0	0	0	1	0	0	0	0	0	9	0	0	0	0	16	7	2	0

TABLE NO. V.—SHOWING CAUSES OF DEATH FOR YEAR ENDING DECEMBER 31, 1897—Continued.

TOWNS.	Races.	POPULATION.		ANNUAL DEATH RATE PER 1,000.		Typhoid Fever.	Scarlet Fever.	Malarial Fever.	Diphtheria.	Whooping Cough.	Measles.	Pneumonia.	Consumption.	Brain Diseases.	Heart Diseases.	Neurotic Diseases.	Diarrhoeal Diseases.	All Other Diseases.	Accident.	Suicide.	Violence.	TOTAL DEATHS		Deaths Under Five Years	Still Born.
		By Races.	Total.	By Races.	Total.																	By Races.	By Towns.		
WINSTON-----	White. } Colored.	5,200 4,800	10,000	11.5 32.7	21.7	3 3	1 0	0 0	0 1	2 16	0 0	4 11	11 38	3 12	7 9	0 1	13 17	16 46	0 3	0 0	0 0	60 157	217	16 60	5 22
Total 20 towns.	White. } Colored.	79,178 58,975	138,153	11.1 20.5	15.1	46 37	1 0	20 44	3 2	7 43	3 4	70 95	91 204	58 56	72 62	12 11	108 99	370 527	13 25	1 0	1 0	876 2085	227 379	65 152	65
Grand total-----		138,153				83	1	64	5	50	7	165	295	114	134	23	207	897	38	1	1	2085	606	188	188

N. B.—In order to assure, as far as possible, the accuracy of the mortuary statistics of the cities and towns, the reporters were required to sign this certificate: "I hereby certify that this report gives the *whole* number of deaths occurring within the corporate limits during the above month."

TABLE VI.—SHOWING CAUSES OF DEATH FOR YEAR ENDING DECEMBER 31, 1898.

TOWNS.	Races	POPULATION.		TEMPORARY ANNUAL DEATH RATE PER 1,000.		Typhoid Fever.	Scarlet Fever.	Malarial Fever.	Diphtheria.	Whooping Cough.	Measles.	Pneumonia.	Consumption.	Brain Diseases.	Heart Diseases.	Neurotic Diseases.	Diarrhœal Diseases.	All Other Diseases.	Accident.	Suicide.	Violence.	TOTAL DEATHS		Deaths Under Five Years.	Still Born.
		By Races.	Total.	By Races	Total.																	By Races.	By Towns.		
ASHEVILLE	{ White. Colored.	8,000 5,000	13,000	13.6 26.4	18.5	3 9	0 0	0 0	0 0	0 0	0 0	6 18	4 24	11 5	8 9	2 2	13 13	54 52	8 3	0 0	0 0	0 0	109 *241	25 28	7 10
CHARLOTTE	{ White Colored	17,153 9,000	26,153	8.3 18.0	11.7	5 4	0 0	0 4	0 0	1 0	0 0	10 11	12 18	8 3	10 11	8 11	24 20	69 84	3 0	1 0	0 0	0 0	143 305	52 57	14 25
DURHAM	{ White. Colored.	4,000 2,000	6,000	12.7 5.0	10.2	1 0	0 0	1 0	1 0	0 1	0 1	1 1	12 4	4 1	3 0	1 2	8 1	19 3	0 0	1 0	0 0	0 10	51 61	16 3	1 3
FAYETTEVILLE	{ White. Colored.	3,500 2,500	6,000	9.1 20.0	13.7	4 8	0 4	2 0	0 0	0 0	0 0	1 2	1 9	1 6	4 2	1 5	10 7	12 1	0 0	0 0	0 22	82 13	8 5	2 5	
GOLDSBORO	{ White. Colored.	4,500 2,500	7,000	8.0 25.2	14.1	1 0	0 0	0 6	0 0	0 1	2 2	1 4	1 7	0 6	2 0	1 6	7 29	18 3	0 0	1 0	0 63	99 28	14 7	8 8	
GREENSBORO	{ White. Colored.	6,000 4,000	10,000	7.0 22.5	13.2	0 7	0 5	0 0	0 0	0 0	0 0	3 3	5 18	2 4	4 4	0 3	8 5	19 39	1 2	0 0	0 0	42 132	15 32	5 17	
HENDERSON	{ White. Colored.	2,250 2,000	4,250	7.1 13.0	9.9	4 2	0 0	0 0	0 0	0 0	0 0	0 4	2 2	2 1	1 0	0 3	4 12	0 4	0 0	0 0	0 16	42 26	9 4	3 3	
HILLSBORO	{ White. Colored.	400 300	700	20.0 3.3	12.8	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 1	0 0	0 0	0 0	8 0	0 0	0 0	0 1	9 0	1 0	0 0	
LENOIR	{ White. Colored.	900 300	1,200	3.3 3.3	3.3	1 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	2 1	0 0	0 0	0 3	4 1	0 0	0 0	
MARION	{ White. Colored.	800 400	1,200	8.7 7.5	8.3	1 0	0 0	0 0	0 0	0 0	0 0	0 2	1 0	0 0	0 0	2 1	1 0	0 0	2 0	0 0	0 7	10 3	1 0	2 1	

TABLE VI.—SHOWING CAUSES OF DEATH FOR YEAR ENDING DECEMBER 31, 1898.—Continued.

TOWNS.	Races.	POPULATION.		TEMPORARY ANNUAL DEATH RATE PER 1,000.		Typhoid Fever.	Scarlet Fever.	Malarial Fever.	Diphtheria.	Whooping Cough.	Measles.	Pneumonia.	Consumption.	Brain Diseases.	Heart Diseases.	Neurotic Diseases.	Diarrhœal Diseases.	All Other Diseases.	Accident.	Suicide.	Violence.	TOTAL DEATHS.		Deaths Under Five Years.	Still Born.
		By Races.	Total.	By Races.	Total.																	By Races.	By Towns.		
MONROE	{ White. Colored.	1,800 600	2,400	8.9 21.7	12.1	2	0	2	0	0	0	3	0	0	1	0	6	6	2	0	0	19	29	0	0
NEWBURN	{ White Colored.	3,500 6,000	9,500	12.8 18.2	16.2	1	0	6	0	0	0	0	14	4	3	0	6	11	0	0	0	445	154	11	7
OXFORD	{ White. Colored.	1,200 1,100	2,300	17.5 20.9	19.1	0	1	0	0	2	0	3	1	2	2	0	3	10	0	0	0	23	44	8	2
RALEIGH	{ White. Colored.	8,500 7,500	16,000	12.7 18.0	15.2	0	1	0	1	0	0	7	12	16	8	1	10	50	1	1	0	108	243	33	16
ROCKINGHAM	{ White. Colored.	1,300 450	1,750	6.9 11.1	8.0	1	0	0	0	0	0	1	2	0	0	0	0	3	0	0	0	9	14	0	0
ROCKY MOUNT	{ White. Colored.	1,600 1,000	2,600	8.1 8.1	8.1	1	0	2	0	0	0	1	0	2	2	0	5	0	0	0	0	13	21	1	0
SALEM	{ White. Colored.	4,100 450	4,550	8.3 13.3	8.8	1	0	0	0	0	0	0	4	0	3	0	0	24	0	0	0	34	40	6	4
SALISBURY	{ White. Colored.	4,000 2,000	6,000	15.5 28.0	19.7	6	0	0	0	0	0	5	6	1	3	0	14	24	3	0	0	62	118	9	2
SCOTLAND NECK	{ White. Colored.	775 425	1,200	14.1 11.8	13.3	0	0	0	0	0	0	0	1	0	1	0	0	18	2	0	0	56	7	1	1
TARBORO	{ White. Colored.	1,200 1,300	2,500	11.7 4.6	8.0	2	0	1	0	0	0	0	2	2	1	2	1	3	0	0	0	14	20	0	0

TABLE VI.—SHOWING CAUSES OF DEATH FOR YEAR ENDING DECEMBER 31, 1898—Continued.

TOWNS.	Races.	POPULATION.		TEMPORARY ANNUAL DEATH RATE PER 1,000.		Typhoid Fever.	Scarlet Fever.	Malarial Fever.	Diphtheria.	Whooping Cough.	Measles.	Pneumonia.	Consumption.	Brain Diseases.	Heart Diseases.	Neurotic Diseases.	Diarrhoeal Diseases.	All Other Diseases.	Accident.	Suicide.	Violence.	TOTAL DEATHS.		Deaths Under Five Years.	Still Born.	
		By Races.	Total.	By Races.	Total.																	By Races.	By Towns.			
WARRENTON	{ White. Colored.	970 765	1,735	6.2 7.8	6.9	0	0	0	0	0	0	0	0	0	1	0	3	1	1	0	0	6	12	3	1	
WASHINGTON	{ White. Colored.	3,000 4,500	5,500	18.0 31.2	24.0	1	0	0	0	0	0	4	5	1	3	5	18	15	2	0	0	54	132	24	1	
WELDON	{ White. Colored.	700 750	1,450	4.3 22.7	13.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	20	1	0	
WILMINGTON	{ White. Colored.	11,000 15,500	26,500	14.6 21.7	18.7	4	0	9	0	0	0	6	10	4	8	0	5	113	2	0	0	161	497	27	5	
WILSON	{ White. Colored.	2,500 2,300	4,800	16.4 14.4	15.4	2	1	2	0	0	0	2	8	4	3	2	8	7	2	0	0	41	74	13	0	
Total 25 Towns		92,448 71,640	164,088	11.3 19.2	14.7	41 53	2 0	26 82	0 11	3	1	57 86	106 197	65 48	73 77	17 20	152 126	472 630	26 36	4	0	7	1045 2419	279 407	188	80
Grand total			164,088			94	2	108	0	14	8	137	303	113	150	37	278	1102	62	4	7	7249	686	268	268	

* This does not include deaths among visitors.

N. B.—In order to assure, as far as possible, the accuracy of the mortuary statistics of the cities and towns, the reporters were required to sign this certificate: "I hereby certify that this report gives the *whole* number of deaths occurring within the corporate limits during the above month."

MARITIME QUARANTINE.

Among the serious dangers that menace the health of our people are the epidemic infectious diseases which come from abroad, cholera and yellow fever. Cholera is in evidence only occasionally, when prevailing in distant ports with which we trade; but yellow fever, whose home is in Havana, right at our doors, threatens our Southern States with invasion every year. To our sorrow we know that too often this enemy has eluded the quarantine as it has heretofore been, and still is, administered, and effected a lodgment on our shores, causing sickness and death on a large scale, as well as a disastrous interference with the business of the infected regions, and, incidentally, of the whole country.

At the annual meeting of the Board at Greensboro in May, 1894, the subject of maritime quarantine, as applicable to our State, was fully discussed, and, the United States Marine Hospital Service, having expressed a willingness to undertake it, the quarantine of our port of Wilmington was turned over to that department of the General Government—as stated in our Sixth Biennial Report. Since that time the necessary wharves, disinfecting plant and hospital have been erected and the station properly manned. The service has been efficiently administered, as is shown by the fact that no infectious disease has gained an entrance through that port.

Our sister States to the south of us have administered their own quarantines, how successfully appears from the epidemic of yellow fever in 1897. While it is true that they were assisted by the M. H. S., the authority and responsibility were divided, and there seems to have

been a lack of harmony between the United States and the local officials. Without expressing any opinion as to which service was most responsible, the fact remains that the widespread epidemic was the tragic result of inefficiency somewhere. In consequence, the whole subject of maritime quarantine became a burning question with the sanitarians of the country. As showing our part in this important discussion, we respectfully refer you to the extracts from the editorial columns of the *Bulletin* given below.

Now that the island of Cuba has come under the control of the United States Government, and the proper sanitary regulations can be thoroughly carried out, we are not without hope that the disease may, in the course of time, be finally stamped out. At any rate, the problem of keeping it within bounds has been greatly simplified by our having control of its point of origin and departure.

[From December Bulletin, 1897.]

As a result of the recent epidemic of yellow fever on our Gulf coast, with its disastrous consequences in loss of life and interference with commerce, the sanitarians of the country and the people, especially of the South, are at present deeply interested in devising some means of preventing in future the lodgment upon our shores of these foreign pests. The reassembling of Congress, of which legislation will be asked, adds to the importance of the discussion just at this time. Owing to our port of Wilmington, this is a matter that nearly concerns not only the people of our chief city, but of our whole State, and we therefore feel it to be our duty to present our views for whatever they may be worth. The drift of opinion is unquestionably towards supervision and control of maritime quarantine and interstate communication by the General Government. The opposition to this is based chiefly upon the fact of undue interference with the rights of the States. Inasmuch, however, as this opinion, if not restricted to them, in fact, is voiced for the most part by State and municipal health officers, whose personal interests might be jeopardized, it is a question as to how much their opinion should be discounted. We yield to no man in our devotion to home rule, nor in the depth and earnestness of our conviction, which is a matter of

inheritance, as well as independent judgment, that the preservation of rights reserved to the States under the Constitution, is of the last importance and absolutely essential to the continuance of this government as a free republic; but we realize also that certain other rights were relinquished to the General Government for the manifest good of the individual States themselves, and among these was the right to declare and prosecute war against a foreign enemy. To question the necessity for such an arrangement would be absurd. With each State in full control of its own troops, volunteers, not regulars, whose commanding officers, in some instances at least, owed their positions, not to the possession of ability and fitness, but to personal or political power, the necessary concert of action between them would be simply impossible. That it is no fancy picture was shown by the very want of harmony between the United States and State officials in the epidemic just ended. Now, the foreign enemy, represented by the pestilential diseases, is far more to be dreaded than an army with banners. With the latter peace can be declared, but with the former there is no peace—they never give up short of complete extermination. Year in and year out they threaten our shores, and armed with their deadly toxines, they commit infinitely greater havoc in the life history of a nation than ever comes from war in the ordinary meaning of that word. Our resistance to infectious diseases is truly a fight, and should be war to the knife, for their merciless hoards fight under the black flag and never give quarter. This being true, it is perfectly clear to our mind that it would be the part of wisdom to commit the protection of our long coast line to the United States, aiding them when need arises, with both men and treasure, and that in doing so we would, in no way, violate the Constitution of our country, even as our State-rights men construe it, but we would, on the contrary, really obey it, and at the same time more effectually protect the people.

As a further expression of our views, we take pleasure in printing the subjoined able editorial from a recent issue of the *Nashville American*:

“We were surprised to find in the *Memphis Commercial Appeal* a lengthy and labored editorial article in opposition to national control of the quarantine service. It would be expected that Memphis, with its present sad and disastrous experience, would be glad to accept the strong arm of the National Government in protection from future ravishes of the yellow death. And such, no doubt, is strongly the popular sentiment of Memphians. The *Scimitar* takes that view, but the *Commercial Appeal* sacrifices sense for sentiment, and devotes a column of its space to arguing that quarantine is a prerogative of State sovereignty that must not and shall not be surrendered.

"Were an enemy's fleet in the Gulf of Mexico, threatening to ascend the Mississippi River and lay waste the cities on its banks, it would be as sensible to reject Government aid in defense of such an attack as it is to refuse Government protection against the invasion of a deadly epidemic. The States would surrender no right by relinquishing the quarantine privilege, but impose an expensive and troublesome duty on the Federal Government. The Southern States should count themselves peculiarly fortunate if they could induce the Federal Government to undertake such a work. The South would derive by far the greatest benefit from an effective quarantine service. Local quarantine has, in the present epidemic and all previous epidemics, proved a farce and a failure. Barring Louisiana, no Southern State maintains a coast quarantine that is worthy of the name, and Louisiana now suffers bitterly from the negligence of her neighbors.

"State quarantines are rendered ineffective by mutual jealousies that prevent cooperation, and they are overridden by the competition for tropical trade. They are necessarily weak because the States are not strong enough to support them financially or otherwise, and the lack of unity added to this makes them entirely ineffective.

"An epidemic disease is something that really concerns the whole country, or in the narrowest sense a large portion of it. It affects interstate commerce. The trade of New York and Chicago has suffered because of yellow fever in the South. Nashville has suffered materially in that way, though there has been no epidemic of yellow fever within two hundred miles of this city. These facts make it the duty of the General Government to undertake the prevention of future invasions of the yellow fever.

"The *American* is thoroughly Democratic on the question of local self government, and would never consent to yield that principle in any essential respect, but quarantine is a matter very much like carrying the mails or the regulation of commerce between the States. Its exercise by the National Government would afford us the assistance and protection in a much more marked degree than it would enforce power. We would surrender no liberties because quarantine was intrusted to the Federal Government instead of the several States.

"But the strongest argument in favor of Federal quarantine is that State quarantines are failures, and this thing of yellow fever paralyzing a large portion of the country every few years must be stopped. The Government can stop it, and it behooves the Southern cities to invoke its strong arms in their defense."

For carrying out the idea of a national quarantine two plans have been suggested: one is to commit it to the Marine Hospital Service,

which bureau has for many years been engaged in quarantine work, by enlarging its powers and adding to its duties; the other is the establishment of a Department of Public health.

In pursuance of the former plan Senator Caffery, of Louisiana, introduced in the Senate the following bill, entitled "A bill amending an act granting additional quarantine powers and imposing additional duties upon the Marine Hospital Service," approved February fifteenth, eighteen hundred and ninety-three.

The essence of this bill, which was printed in full in the Bulletin, was to give the U. S. Marine Hospital Service entire charge of the maritime quarantine of the whole country. We would call attention to the fact that the author of this bill is a Southern Democratic Senator, and doubtless a thorough believer in the doctrine of State sovereignty; and also to the fact that he represents Louisiana, whose quarantine facilities and methods are unexcelled anywhere. In pursuance of the second plan a bill has been proposed establishing a "Department of Public Health."

The essential features of this bill were the appointment of a Commissioner of Public Health, who could appoint an Assistant Commissioner of Public Health; and the meeting with the Commissioner in Washington twice a year of an advisory council, to be composed of the Secretary or executive officer of each State and Territorial Board of Health; and the transference to the Department of Public Health of "all the powers and duties now and heretofore conferred upon the Marine Hospital Service or any officer thereof."

There are several objections to this bill, but the most important—and to our mind fatal one—is the injection of politics into our quarantine system, for the President has to appoint not only the Commissioner, but all the medical officers—the latter after an examination, it is true, but the rules governing the examinations are to be made by the Commissioner. Admitting that the President would always appoint a good man, he would almost surely be inexperienced in that particular work, and by the time he thoroughly learned it he would have to give place to another inexperienced man, in all probability. Then, too, there are many able men "learned in sanitary science" who, however accomplished in other respects, are lacking in that rare, but in this case most important, gift of executive ability. Few men are born with this peculiar talent to any marked degree, and most successful administrators become such by close application and long experience. Is it likely that a political appointee from civil life, changed every four or eight years, would make a first-class executive? We think not.

The Marine Hospital Service, as at present constituted, is as far from the baneful influence of "practical politics" as are the Army

and Navy. Its members are appointed solely for fitness, and their business in life is fighting disease—largely through quarantine work. They are seasoned veterans in that peculiar warfare. Their commanding officer, the Surgeon General, is always one of the most experienced men, and while it might happen that he was not the man in the service best fitted for that position, it would always be true that he had been thoroughly trained in the business. And if it were our personal business involving great consequences to us, as the proper management of our quarantine service does to the people of our country, we would not hesitate a moment in deciding in favor of trained experts—and we do not believe the candid reader would either.

Another objection, we think, is the large and unwieldy advisory council, strange as it may sound, coming from one of the beneficiaries of that feature with its delightful semi-annual visit to our beautiful capital city, with all expenses paid by Uncle Sam. While we might be able to tell the Commissioner of Public Health, recently appointed from civil life, something he did not know about disinfection and quarantine, it would be much better to have some one in charge who could tell us something we did not know, perhaps.

And besides, there would be so many conflicting views, probably, and so many modifications of the rules for particular localities desired that confusion rather than enlightenment might be the result.

While we do not deny that, in many instances, there is wisdom in a multitude of counsellors, we have come to the deliberate conclusion, after considerable experience, that in sanitary matters an enlightened despotism—an organization with the power and the will to override merely individual or local preferences in the interests of the whole people, would be best. We are afraid that our confreres will think this rank heresy, but it is what we believe, nevertheless.

[From Bulletin, February, 1898.]

The Quarantine Convention of the South Atlantic and Gulf States, which met at Mobile on the 9th instant, after a session of three days, which included many learned papers and excellent speeches, we are informed, finally expressed its conclusions in the following resolutions:

“Resolved. That it is the sense of this Convention that Congress be requested to provide for a Department of Public Health as soon as possible.

“2. That it is the sense of this Convention that Congress should enact laws to provide for an efficient maritime quarantine to be uniform and impartial in its application to the different commercial ports of this country, so as to give no one or more of them undue

commercial advantage over the others and to be enforced by the several State and municipal quarantine or health boards, if they will undertake to do so, leaving also to the States the power to prescribe and enforce additional reasonable safeguards of the health of their communities, provided that such State action shall not unreasonably obstruct commerce.

"3. That Congress should aid the several States in establishing and maintaining uniform, reasonable and efficient quarantine laws for affecting, but not regulating interstate commerce, leaving to each State adequate power to protect, as it shall deem best, the lives and health of its people.

"4. That Congress shall leave exclusively to the States the regulation of their purely internal commerce and the provision of such quarantine or sanitary laws and regulations as they deem advisable to that end; that in the framing of quarantine laws and regulations, and in their enforcement, Congress should avail itself of the learning, experience and ability of the medical profession in the fullest measure possible, and especially by way of an advisory council."

The reporter of the *Atlanta Constitution*, commenting on this action, says:

"The adoption of this particular series of resolutions was more of an accident than anything else, and the verbiage of the several recommendations means nothing. The direct line between State and Federal control of quarantine was drawn and the adoption of the Clarke substitute was due only to the fact that it was the first expression of the majority opinion that reached a vote. It shows simply that the Convention is made up of delegates representing every possible interest affected by quarantine regulations who want to have the assistance of the Federal Government in fighting the next epidemic which menaces them."

So it seems that the South Atlantic and Gulf States, where the strongest opposition to the suggestion was to be found, are in favor of a quarantine administered by the Federal Government. It is settled, therefore, that the country demands a national quarantine system.

Now, the practical question before us is, by whom shall it be administered—by the Marine Hospital Service, a compact, thoroughly drilled and disciplined corps, already seasoned by several campaigns, or by a national department of public health, which, in the nature of things, would be under the baneful influence of politics and composed in too many instances of inexperienced persons, to say the least? In a word, shall we fight the enemy with the regular army or with the militia? or, as it is proposed for the "Department" to utilize the Marine Hospital Service, shall we put a militia general in command of the regular troops? It seems to us that

there can be only one answer to the question for any fair-minded man, for any one uninfluenced by prejudice or considerations of self-interest. * * * *

In the *Literary Digest* of the 15th inst. we note under the heading "Is Quarantine of any use?" this bright and interesting extract from the London *Hospital*, setting forth the well known attitude of Great Britain on the subject of quarantine in general:

"It does not surprise us that an ignorant population should stand on guard at railway stations with loaded firearms, and should forbid trains to stop or passengers to alight, but it does surprise us to find a medical contemporary even appearing to admit that, 'the paper plausibilities of quarantine' are able to confer some kind or degree of additional security upon States in the vicinity of those which may be visited by a yellow fever epidemic.

"The belief that any such security can be afforded in the manner indicated is one which could hardly fail to spring up and flourish during the darknes of the Middle Ages. The first proposals for quarantine date from the middle of the fourteenth century, and originated in the city of Milan, as a precaution against the Black Death. The example thus set was followed in Venice, where the first *lazar-etto* was established in 1423, the disease then to be kept at bay being bubonic plague. Two centuries later the system was almost universal and had reached its full development, insomuch that very elaborate regulations were formed and enforced in this country with reference to the plague, which appeared so early as in 1636, and which committed such terrible ravages in London and in some country districts, as at Eyam, between 1663 and 1666. These endeavors to exclude plague were as effectual, in the words of Sir John Simon, 'as if their intention had been to bar out the east wind or the new moon': but, notwithstanding this, the epidemic of cholera which prevailed in Europe in 1831 found not only the populace, but even the sanitary authorities of this country, prepared to trust in quarantine as their supreme hope. As the Government could only control the regular channels of trade or passage, all persons of influence resident on the coast, and particularly in retired villages, were urged to impress upon their neighbors the dangers of intercourse with smugglers and other evaders of quarantine. It might have been thought that this very injunction would of itself have been sufficient to prove to those who issued it the utter futility of the whole proceeding. The Government was able to interfere just so much as to cause the maximum of inconvenience and loss to healthy people, and the maximum of injury to trade; and, when this was done, they were unable to touch so much as the fringe of the innumerable points of leakage, which even the best organized system of quarantine must leave wholly unprovided for. Notwithstanding the quar-

antine, the disease was not only introduced, but it spread with terrible rapidity, and produced a mortality of many thousands, the precise amount of which it would not be impossible to ascertain. Taught by experience, the General Board of Health, in 1849 and 1852, strenuously pointed out that quarantine could not give any but a false security for the purpose it pretended to accomplish; and, adducing illustrations of its futility and oppressiveness as commonly administered, boldly proposed, as a practical conclusion, that this country should entirely set aside its existing quarantine establishments, and should rely exclusively upon the protection it could derive from a system of local sanitary improvements. Our present method is to admit disease freely, but to be on the watch for it when it comes. If plague or yellow fever were brought to any English port, the actual sick would be landed and placed in a proper hospital for the reception of infectious cases; the sound would be permitted to proceed to their several destinations, the sanitary authorities of which would be instructed to keep them under observation until all danger was past, and to send them to a hospital if the disease should show itself in them; and the ship and its cargo would be subjected to disinfection. When we had quarantine plague and cholera were not only introduced, but destroyed their thousands. During the last European epidemic cholera was introduced into many ports, and it fizzled out as harmlessly as a lighted match on a stone floor."

We do not quote this for the purpose of endorsing it as a whole, but only in part. Whatever may be the experience of Great Britain, we are thoroughly satisfied that maritime quarantine is necessary to the protection of the United States, which have perennial yellow fever right at their doors. But internal quarantine is another matter. We do not believe that in the present state of public opinion on the subject of sanitary regulations, with our generally crude and imperfect machinery, moving feebly and irregularly for want of power to drive it—money—to enforce them, that it can possibly be made effective. So that it is of the last importance with us to prevent the diseases in question from ever gaining a foothold on our shores. How can that best be done? By dividing the work between the General Government and the States. Let us suppose, for example, that the State of Alabama and the city of Mobile should leave quarantine to the United States authorities and spend all the effort and money now divided between quarantine and local sanitation on the latter, and put the city and other exposed points in such shape that the yellow fever, if introduced, would "fizzle out as harmlessly as a lighted match on a stone floor," would not they both be far safer than they are now? Certainly they would.

Not to weary the patient reader further, it seems to us almost a

self-evident proposition that the practicable and sensible solution of this matter is to turn over to the General Government absolutely and entirely maritime quarantine under the administration of the Marine Hospital Service, and let us, the States and municipalities, devote all our energies and what little money we can get to local and internal sanitation.

LEGISLATION.

The most difficult problem in our sanitary machinery has always been the relationship between the County Superintendent of Health and the Board of County Commissioners. Prior to 1897, the Superintendent was elected by the County Board of Health, which was dominated by the registered physicians of the county who were, by the constitution of the Board, in a large majority. The County Commissioners, however, had absolute control of his compensation until the passage of the Act of 1893 (chapter 214), by which the Superintendent was given the option of demanding the fees usual in his county for his services, if he was not content with the salary offered him. This was, in some cases, not satisfactory to the Commissioners, and it was also found that occasionally the methods employed in the election were objectionable. The General Assembly of 1897 so amended the Act of 1893 as to give the election of the Superintendent and the fixing of his compensation to the Commissioners, at the same time reducing his term of office from two years to one. This plan has not proven satisfactory. It has resulted, in some counties, in belittling the office by the very small salary paid—some Boards, we are informed, even going so far as to farm out the office to the lowest bidder, thereby securing, in the nature of things, the most inferior physician in the county for an office of much responsibility.

After studying the question carefully for many years, we have come to the conclusion that something of the character of a compromise between the two methods, by which the Commissioners would still retain complete control, but would act in these health matters with the

advice of physicians associated with them, would be best. An amendment accomplishing this object would read somewhat like this: "There shall be in every county a County Medical Society, composed of all registered physicians resident in the county in active practice, of whom 25 per cent shall constitute a quorum. The County Medical Society shall meet in the county court-house at noon on the first Monday in May, in the odd years, beginning with 1899; and after organizing, by the election of a President, a Vice-President and a Secretary, shall proceed to elect, by ballot, three registered physicians, resident in the county, who shall, together with the Board of County Commissioners and the Mayor of the county town, compose the County Board of Health: *Provided*, that when the Board of County Commissioners consists of three members only, two physicians shall be chosen. The County Board of Health, of which the Chairman of the Board of County Commissioners shall be *ex officio* Chairman, shall meet in the county court-house at noon on the Tuesday after the first Monday in May of the odd years, beginning with 1899, and elect from the registered physicians in active practice, resident in the county, a County Superintendent of Health, who shall serve for two years, and shall, at the same meeting, fix his compensation. The County Board of Health shall have the power to remove, for good and sufficient cause, the said Superintendent of Health from office and elect his successor. The said County Board of Health shall meet at the call of its Chairman whenever, in his opinion, or in that of a majority of the Board, the interests of the public health require it. The members of the County Board of Health shall receive the same per diem and mileage as is paid County Commissioners: *Provided*, that if the said County Medical Society, for any reason, fails to meet

and elect members of the County Board of Health, the Board of County Commissioners shall elect the County Superintendent of Health."

We believe that some such arrangement as this would meet the difficulties of the situation, and we trust that the incoming General Assembly will, in its wisdom, enact the necessary legislation.

REPORT OF TREASURER FOR TWO YEARS ENDING DECEMBER 31, 1898.

1897		CREDIT.	
Jan.	1.	Return of amount advanced by Treasurer on 1896 account	\$2.58
	2.	Drayage, 5 loads of <i>Bulletins</i> at various times....	1.00
		Salary of Secretary for December, 1896	83.34
		Clerical help for December, 1896	16.66
		Office rent for last quarter	15.00
	9.	Stamps	5.00
	12.	Dr. W. T. Pate, 1 bacteriological examination of public water supply of Winston	10.00
	15.	One copy "Water Supply" and postage on same J. C. Chase, <i>per diem</i> and expenses Health Conference at Charlotte, visits of inspection to Davidson College, Greensboro, Winston, Oxford Orphan Asylum, University, and A. & M. College	4.76
	19.	Postage on special issue of December <i>Bulletin</i> , ordered by Board, 5,000 copies	88.35
		Raleigh Stationery Co., 12 small items from August 1, 1896, to January 1, 1897.....	1.42
	23.	Dr. Albert Anderson, four bacteriological examinations and express on samples	3.85
	28.	Stamps	42.15
Feb.	1.	Salary of Secretary for January	5.00
		Clerical help for January	83.33
	12.	postage on <i>Bulletin</i> January and part of December Dr. S. W. Battle, <i>per diem</i> and expenses annual meeting at Winston, Health Conference at Charlotte, and inspection of State institutions at Raleigh	16.67
			1.52
March	2.	Salary of Secretary for February	64.40
		Clerical help for February	83.33
	29.	Stamps for biennial report	16.67
April	15.	Salary of Secretary for March	10.00
		Clerical help for March	83.34
		Office rent for first quarter of 1897.....	16.66
April	21.	Certified copies of acts amendatory to Health law from Secretary of State	15.00
			2.60
May	1.	Salary of Secretary for April	83.33
		Clerical help for April.....	16.67

	7. Subscription to eight copies of Sanitarian for members	\$28.00
	24. Stamps	10.00
	25. One copy "Manual of American Water Works"	3.00
June	3. Salary of Secretary for May	83.33
	Clerical help for May	16.67
	16. C. M. Busbee, P. M., for stamps	10.00
	24. Dr. J. L. Nicholson, <i>per diem</i> and expenses annual meeting at Morehead	21.15
July	2. Salary of Secretary for June	83.34
	Office rent for second quarter	15.00
	Dr. George G. Thomas, <i>per diem</i> and expenses annual meeting	16.10
	Dr. R. H. Lewis, expenses annual meeting	13.25
	16. A. W. Shaffer, C. E., <i>per diem</i> and expenses annual meeting	24.70
	Dr. W. H. Harrell, <i>per diem</i> and expenses annual meeting	26.60
	19. Southern Express Company, charges on books for Engineer of Board	1.05
	27. Southern Express Company, charges on books transferred	1.30
	28. W. & L. E. Gurley, books ordered by Board for its Engineer	13.50
Aug.	4. Salary of Secretary for July	83.33
	27. Dr. R. H. Lewis, expenses National Conference State Boards of Health at Nashville	44.55
	Capital Printing Company, 500 postal cards, notices to Superintendents	5.00
	30. Dr. J. D. Spicer, <i>per diem</i> and expenses annual meeting	18.75
Sept.	1. Salary of Secretary for August	83.33
	4. Dr. Geo. G. Thomas, <i>per diem</i> and expenses, investigation Goldsboro Water supply	6.75
	7. Dr. J. D. Spicer, money advanced to buy four demijohns for water sample, packing and shipping same	2.35
	17. Dr. Elzear Pelletier, Treasurer, partial payment annual dues National Conference State Board of Health	5.00
	30. C. M. Busbee, P. M., stamps	10.00
Oct.	2. Salary of Secretary for September	83.34
	Office rent, third quarter	15.00
	20. Dr. C. J. O'Hagan, <i>per diem</i> and expenses annual meeting	24.30

Nov.	4.	Salary of Secretary for October	\$83.33
	5.	Western Union Telegraph Company, sundry telegrams	1.00
	6.	C. M. Busbee, P. M., postage on September <i>Bulletin</i>	1.02
	15.	C. M. Busbee, P. M., stamps	5.00
	27.	Dr. J. L. Nicholson, <i>per diem</i> and expenses Health Conference, at Goldsboro	23.75
Dec.		Dr. F. P. Venable, expenses Health Conference at Goldsboro	8.90
	2.	Dr. R. H. Lewis, expenses Health Conference at Goldsboro	8.20
		Salary of Secretary for November	83.33
	15.	Elzear Pelletier, Treasurer, second assessment annual dues National Conference State Board of Health	5.00
		Post-office order (Canadian) for above	10
	17.	A. W. Shaffer, <i>per diem</i> and expenses inspection public water supplies of State	211.35
	18.	Dr. W. T. Pate, for six bacteriological examinations public water supplies	60.00
	1898		
Jan.	4.	Salary of Secretary for December	83.34
		Office rent for fourth quarter, 1897	15.00
	19.	Dr. Albert Anderson, nine bacteriological examinations public water supplies	85.00
	21.	Dr. A. N. Bell, publisher, eight subscriptions to <i>Sanitarian</i> for members of Board	28.00
Feb.	3.	Salary of Secretary for January	83.34
	26.	Capital Printing Company, 500 postal cards, small-pox notices	5.00
March	5.	Western Union Telegraph Company, sundry telegrams (small-pox)	4.57
	7.	Salary of Secretary for February	83.33
		Dr. R. H. Lewis, expenses Pure Food and Drug Congress at Washington, D. C.	24.52
	12.	C. M. Busbee, P. M., stamps	10.00
April	1.	Salary of Secretary for March	83.34
		Office rent first quarter, 1898	15.00
May	9.	Salary of Secretary for April	83.33
	17.	500 postal cards for small-pox notices	5.00
May	19.	Canadian post-office money order to Dr. Elzear Pelletier, Treasurer, for third assessment on annual dues to National Conference State and Provincial Boards of Health	5.10

	25.	Dr. C. J. O'Hagan, <i>per diem</i> and expenses annual meeting at Charlotte	\$83.50
		Dr. W. T. Pate, bacteriological examination Concord water, second sample	10.00
		Dr. R. H. Lewis, expenses annual meeting at Charlotte	11.75
		A. W. Shaffer, <i>per diem</i> and expenses annual meeting and visit of annual inspection to Concord ..	33.50
June	3.	Salary of Secretary for May	83.33
	4.	Dr. J. L. Nicholson, <i>per diem</i> and expenses annual meeting	35.50
July	5.	Salary of Secretary for June	83.33
		Office rent for second quarter	15.00
	7.	Western Union Telegraph Company, sundry telegrams in regard to small-pox	3.17
	19.	Paid for stamps	15.00
	27.	Paid for stamps	5.00
		One copy U. S. Postal Guide for 1898-'99, and one copy Zell's Condensed Cyclopædia	3.50
Aug.	3.	Salary of Secretary for July	83.33
		T. H. Briggs & Sons, two pairs scissors for office ..	1.75
	15.	Dr. R. H. Lewis, expenses to National Conference State and Provincial Boards of Health at Detroit ..	60.43
	23.	Dr. Geo. G. Thomas, <i>per diem</i> for visits to Wilson, Raleigh, and Southport	12.00
Sept.	2.	Salary of Secretary for August	83.33
		Dr. R. H. Lewis, expenses to Durham to inspect cotton mill sewers	2.55
	23.	Dr. W. T. Pate, two bacteriological examinations of suspected water from North Wilkesboro	20.00
	29.	Dr. Geo. G. Thomas, <i>per diem</i> and expenses inspection State Hospital and School for Deaf and Dumb at Morganton	23.05
Oct.	2.	A. W. Shaffer, expenses to American Public Health Association at Ottawa, Canada	90.25
	4.	Salary of Secretary for September	83.33
	14.	1,000 postal cards for correspondence and notices to Superintendents of Health and to Chairmen Boards County Commissioners	10.00
		Dr. S. W. Battle, <i>per diem</i> and expenses to Goldsboro Health Conference and annual meeting at Charlotte	44.90
Nov.	2.	Salary of Secretary for October	83.33
Dec.	1.	Salary of Secretary for November	83.33

15.	Dr. S. W. Battle, expenses to American Public Health Association at Ottawa.....	\$79.70
	Dr. R. H. Lewis, expenses of inspection of State Hospital, and Deaf and Dumb School at Morgan- ton,	7.25
	Dr. R. H. Lewis, expenses for investigation of ma- laria at Swepsonville.. ..	4.45
	Dr. R. H. Lewis, expenses Health Conference at Winston.....	7.20
27.	A. W. Shaffer, <i>per diem</i> and expenses Winston Health Conference.....	21.55
	Canadian P. O. Order, annual dues National Con- ference State and Provincial Boards of Health....	15.20
28.	Miss K. Wureschke, stenographer, reporting pro- ceedings Winston Health Conference.....	8.00
30.	H. D. Holton, Treasurer, Transactions American Public Health Association, 1897 and 1898	10.00
31.	C. T. Bailey, Postmaster, postage on <i>Bulletin</i> for October and November.....	1.36
	Office rent third and fourth quarters	30.00
	Salary of Secretary for December	83.35
	Sundry small cash items, telegrams, drayage, post- age on Bulletin, for 1897.....	2.99
	Sundry small cash items, telegrams, drayage, post- age on Bulletin, for 1898.....	12.98
	Balance on hand.....	69 40
		<hr/> 4,000.00

1897

DEBIT.

1898

To State appropriation for year 1897.... \$2,000.00

To State appropriation for year 1898 2,000.00

4,000.00

APPENDIX.

THE AIR WE BREATHE.

READ AT THE GOLDSBORO HEALTH CONFERENCE BY RICHARD H.
LEWIS, M. D., OF RALEIGH.

What we call the life of an organized being depends upon the proper correspondence or relationship of that being with its environment, at least with certain essential elements in his surroundings. To make a direct application in the concrete, the most manifestly essential of these elements to the life of man are air, water and food, of which the first named is the most immediately important. It has been demonstrated that life can be sustained for more than a month without food, and for several days without water, but only a few minutes without air. In many cases of drowning, submersion of one minute, in spite of every effort at restoration, has proven fatal, although there are a number of instances of recovery after being under the water five minutes, and in one case as long as fourteen minutes, though this last might be questioned somewhat. Man eats and drinks only a few times daily, but breathes about every three seconds. Indeed, the breath is a synonym of life, and when we come to look into the vital processes, it is easy to understand why it should be. Life is often spoken of as a fire. "The fires of life" is a common expression, used in a figurative sense by the speaker in most instances, probably, but as a matter of fact the fundamental phenomena of what we call life could not be more accurately described in a few words. The illustration has been so admirably given by Prof. Woodbridge, in an address on the "Ventilation of School Buildings," printed in the report of the State Board of Health, of Maine, for 1894-'95, that I feel I would do you an unkindness if I did not substitute it for the best I could do. He says:

"For the purpose of our study to-day we shall regard vital energy as a flame and the body as a furnace, with associated parts for the transformation of heat, or thermal energy, into dynamic or mechanical energy. The fire beneath the boiler imparts most of its thermal energy to the water, transforming the water by blast energy into elastic steam, and that steam gives over a part—a small part—of its energy so gotten to the piston of the engine, and thence it is transmitted through crank and wheel, and belt, and shafting, to the various and scattered points of its final application. The waste between the energy locked in the coal and that to-day made available in the

product, is enormous, and at some future time will, perhaps, be regarded as wickedly prodigal.

"In the body the burning, or energy production, is more nearly at the point of power expenditure, and the process of transformation is so highly effective that in the human or animal machine a pound of fuel in food will produce much more effective energy than a pound of coal burned under a steam boiler.

"There are three requisites to the obtaining of the best result from a boiler fire, the first in the order of importance being a good draught; the second, good stoking; and the third, good coal. The best coal will not burn without an adequate draft. The best stoking will not make a good fire, with the best of coal, without draft. With a strong draft, coal will burn with poor stoking. Inferior coal, with a strong draft and good stoking, may make a hot fire. Of first importance, then, to fire is air; second, stoking; third, fuel quality.

"The same is true of the body's fire. The prerequisites to the most vigorous vitality are: First, abundance of pure air; second, proper and sufficient exercise; third, the best of food. In this case the air is the physical furnace's draft; the exercise is the stoking; the food is the fuel. And here, also, we find the same order of sequence; first in importance being air in adequate quantity and purity; second, exercise; and third, food quality.

"Coarse and ill-adapted food, with an abundance of pure air and exercise, produces finer specimens of physical vigor than the best of food, with impoverished air for breathing, and without exercise. Compare the robust vitality of a coarsely-fed and even poorly-fed out-of-door laborer with that of the most pampered in diet, breathers of the confined air of luxurious apartments, occasionally dainty exercisers in softly-cushioned carriages, and our point is strongly illustrated.

"Without further argument, it must be conceded that that to which is generally given least importance in our thoughts, as compared with the thought given to food and recreation, is really of the greatest importance to our best vitality. We think more of our eating than of our breathing, and more of the loss of a half-day's recreation than of a whole week's deprivation of pure air. Municipalities will spend money by the million for park ways for the occasional outings of their citizens, and on spread-out beauty which gratifies their pride, the meanwhile condemning as wanton waste the spending of a quarter of such sums on the sanitation of school-houses in which the city's educators and children are breathing for thirty hours of every school week.

"We, some of us, need a revolutionizing of ideas as to what our physical life is; first of all, a chemical product, to which air is an

essential element, and for the completeness of which air must be had in freshness and abundance."

It will interest you, I am sure, to know the actual physical facts on which this apt simile is based. In brief they are as follows: Atmospheric air is composed of oxygen, 209.6 parts per 1,000 volumes; nitrogen, 790; carbonic acid, 0.4; and very minute quantities of ammonia, organic matter, ozone, common salt, and other mineral substances. Of these various elements, the essential one is oxygen. The vital changes which take place in the tissues of the body are largely oxidations—the chemical union of oxygen with their constituent elements, and the formation thereby of new products—more notably carbonic acid—just as the oxidation of carbon in fuel makes carbonic acid. Now, how is the oxygen of the air carried to the tissues? By the red corpuscles of the blood, which exist in enormous quantities, it being estimated that in a man weighing 140 pounds there are two million five hundred thousand millions of them. In the circulation of the blood, according to the physiologists, they pass through the lungs a little oftener than twice in every second, and in that time expose a surface to the air therein equal to 144 square yards. Absorbing the oxygen from the air in the lungs, they carry it to the tissues and dump it there, so to speak, while the liquid part of the blood loads up with carbonic acid to be thrown off into the air when it reaches the lungs once more. It is evident, therefore, that the air leaving the lungs must have a larger proportion of carbonic acid than the air entering them, and less oxygen.

The necessity of air to life is clear, but what we are interested in this evening is the relation between the air we breathe and health. The effect upon the health may be either negative or positive. Of the former, an insufficiency of oxygen is the chief: there is a lack of fuel, and the vital flame burns low and feebly—the machinery of life runs too slow. But it is on the positive side that we find more to interest us in the various and manifold impurities that are to be found too often in the air we breathe. These impurities are both solid and gaseous. The solid are suspended in the form of dust, to be found particularly in certain trades: living substances, as pollen, etc., but more especially the microscopic plants, known as bacteria, which swarm everywhere and are taken into our lungs with every breath. Fortunately, most of these are innocent, though a limited number are literally the seeds of a corresponding number of diseases. The gaseous impurities are of various kinds, but in the limited time at our disposal I will mention only the most common and the most injurious—carbon dioxide or carbonic acid. This gas, you will remember, is the result of combustion, the oxidation of the tissues, and is thrown off in expiration. It is also produced by combustion in our ordinary gas and lamp lights. As carbonic acid is made by the consumption of oxygen, it is plain that as the former increases in a given amount of air, the latter decreases.

The air expired from the lungs is further vitiated by organic matter thrown off from the system by this channel as well as in exhalation from the skin. It is this which gives the characteristic odor to a close bedroom, occupied by too many people. Of the effect upon the system of air thus vitiated to an excessive degree, the most noted example is the famous Black Hole, of Calcutta. This was a room eighteen feet square, with only two windows, both on the same side, in which the captured British garrison of 146 men was confined for one night. In the morning all were dead but twenty-three. It is, however, the contamination to a far less, but still dangerous, degree that is to be found in many of our homes and school-houses with which we are practically concerned. While the effect of this is not so strikingly manifested as in the instance just cited, it is nevertheless injurious to health, and indirectly the cause of much sickness and many deaths. And the reason for it is plain. A full supply of oxygen is absolutely essential to the proper performance of the vital functions, and if that supply be insufficient—to say nothing of the apparently positively poisonous character of the exhalations from the body—the vital force is reduced, and the power to resist disease is correspondingly diminished. Statistics show that consumption, scrofula, pneumonia, and some other diseases, are far more common among those breathing such an atmosphere than among those having an abundance of pure air. As an illustration of this, Parkes quotes Rossignol to the effect that “previous to 1836, the mortality of the French cavalry horses varied from 180 to 197 per 1,000 per annum. The enlargement of the stables and the ‘increased quantity of the ration of air’ reduced the loss in the next ten years to 68 per 1,000. In 1862-’66 the rate of deaths was reduced to 28½ per 1,000.” Quoting other observers, he says: “In Dundee the ratio of phthisis and other disorders of a similar character, increases with the crowding and the foulness of the air; being at the rate of 3.26 per 1,000 in houses of four rooms and upwards; 5.52 in houses of three rooms; in two-room houses, 6.41; and in one-room houses, 7.44.” The deadly typhus, commonly known as jail or ship fever, while a contagious disease, and propagated by direct infection of one case by another, is most markedly influenced in its mortality by over-crowding.

In an epidemic of that disease some years ago in New York, the wards of Bellevue Hospital would not hold the patients, so more than a hundred were put under an open shed in the back yard, it being summer. While there a squall came up, blew down the shed and thoroughly drenched them. Notwithstanding, not a single one died, while the mortality among those in the hospital was about 25 per cent. Lawson Tait, the great English surgeon, who is as conspicuous for his rank heresy in the matter of disease germs as for his brilliant success in surgery, says that he has ascertained that the amount of air his operated cases have materially influences the result—that the mortality was

greater whenever he violated his rule of giving each case a whole room to herself. But the evidence is conclusive that the diminution of the air supply increases the mortality, not only among the sick, but the well—in other words, that the death rate is more or less in proportion to the impurity of the air we breathe.

The indications that we are breathing impure air are a feeling of heaviness and inertness, with headache and sometimes nausea. So, when you wake up in the morning with "that tired feeling," don't rush off and buy a bottle of patent medicine, but open the window of your bedroom a little and take deeper draughts of God's pure air, uncontaminated by man or beast.

In our Southern towns, owing to the fact that our rooms are larger, as a rule, than in colder climates, and to the further facts, that our houses are generally more or less carelessly built, and therefore full of cracks, and that our usual method of heating is the open fire-place or grate, which is a most excellent ventilator, we do not suffer so much from impure air. And this, doubtless, is the reason that consumption is so much less common with us than with our Northern neighbors who live in tight, warm houses, heated by stoves generally. It is a sad fact, that, right here in our beautiful climate, consumption is playing havoc with our colored people—the death rate among them from that disease being now more than three to one among the whites, and it is also true that when once attacked they die much more quickly than the whites. Although the conditions incidental to ignorance and poverty, general uncleanness and the want of proper food and care are largely responsible for this, there is no doubt in my mind that they are rendered more susceptible to infection and less resistant to the disease by breathing the impure air caused by overcrowding, and to a habit they have of sleeping with their heads covered up. It is, however, not alone in such pronounced and tangible cases as these first cited that vitiated air—vitiated chiefly by the exhalations from human beings—gets in its deadly work. It is in a far more subtle and, therefore, dangerous way, because it is generally overlooked, that this slow poison operates. It is by a gradual sapping of the vitality which renders the individual an easy prey to any disease that may come along. This is particularly the case in children. During the period of growth the vital processes are much more active than after maturity, for the simple reason that not only must all the ordinary running expenses of the system, so to speak, be paid, but a large addition must be made to the surplus fund. In Prof. Woodbridge's illustration of the steam boiler, you will remember that its best work depends upon three things: a strong draft, an abundant supply of oxygen, or, in other words, plenty of fresh, pure air containing its full quota of oxygen; good stoking, exercise; and a sufficiency of fuel of first-rate quality, good food. In this favored land of ours, there are not many children who fail to get

plenty of food, of fair quality at any rate, and a mere allusion to their incessant activity shows them to be excellent stokers, but the draft is not free in far too many instances, and, in consequence, their vital fires burn low, and there is a lack of power to properly propel their machinery of life. In my own special line of professional work I often see the most striking illustrations of the bad effects upon the system of an insufficiency of air. A child comes in, and as soon as my glance falls on his pale face, his lack-lustre eye, his open mouth and stupid expression, I am prepared to hear from his mother that he is not thrifty, that he snores at night, and assumes in his restless sleep all sorts of bizarre positions—in order to breathe better—and am morally certain that he is a victim of what we call adenoid vegetations. These are enlargements in the upper part of the throat analagous to the ordinary enlargement of the tonsils which block up the nostrils at the back end and mechanically prevent the free entrance of air.

It is positively exhilarating to see the effect of the removal of these growths—the opening of the draft flue. The pale, feeble, stupid-looking, lackadaisical little invalid promptly becomes the bright-eyed, rosy-cheeked, hilarious, romping boy, and when night comes ceases to be a contortionist and sleeps like the baby he is.

Now, it makes no difference whether the supply of oxygen is reduced by a positive mechanical obstruction to the inflow of air, as in the the above case, or by robbing the air, that freely enters the lungs, by breathing it over and over again. And this latter is what I am particularly aiming at. While, doubtless, in many of our sleeping apartments such want of ventilation obtains as to produce this effect, it is chiefly in our school-houses that we find it. When your child comes home from school pale and listless, perhaps complaining of dull headache, with no appetite and no eagerness for play, you may be sure that his school-room is not properly ventilated, and that he has not gotten the amount of life-giving oxygen that his Creator intended him to have, and which by a law of his being he has a right to demand. In such a case, it is your plain duty to the child God has given you to see that he is not robbed of his rights in this respect. Public opinion is all powerful in our free, democratic country, and if the people of a community protest against the slow poisoning of their children, and insist upon a correction of the defects, it will be done.

But I have detained you too long, and can, therefore, refer only very briefly to the practical subject of ventilation.

According to Parkes, the amount of fresh air to be supplied during repose ought to be :

For adult males, 3,600 cubic feet per head per hour.

For adult females, 3,000 cubic feet per head per hour.

For children, 2,000 cubic feet per head per hour.

For a mixed community, 3,000 cubic feet per head per hour.

Inasmuch as an average room—say fifteen feet square and ten feet pitch—contains only 2,250 cubic feet of air, it is evident that to meet the above conditions additional fresh air must be admitted, and the air vitiated by breathing correspondingly forced out, even where it has only one occupant. If, however, it be the family bedroom, and occupied by a man, his wife and one child, say, the air must be completely changed four times every hour. This change in the air is what is called ventilation. Time forbids my going into this subject, so I will merely state the practical conclusions as applied to the conditions that obtain with us. They are these: For private houses, I would recommend that when the house is cleaned up in the morning, all the windows should be thrown wide open for the removal of the foul air of the night and the filling of the house with perfectly pure air. Never have anything but an open fire-place in a sleeping room. The ordinary stove, and especially the close kind that is so economical of fuel, is a sanitary abomination. That very fact of its economy of fuel condemns it, for it means that there is no draught to speak of going through it, and the air in the room is not changed as rapidly as it should be. It is far better to add to your blankets, or even to be a little cold, than to be warm—often too warm, and half smothered by carbonic acid. But if you must have a stove, and more than one person sleeps in a room of average size, always—except, perhaps, for a night or two in the bitterest weather—keep one window partially open. If it be so situated as to cause a draught upon the sleeper, fill the open space with cheese-cloth or other porous material, and that, while letting in the air, will prevent a draught.

In the case of school-houses of considerable size, some approved artificial system of heating should be used. In smaller ones, owing to the large size of the room and the enforced distance from the fire of many of the scholars, stoves must be used. But they should be “jacketed” stoves, i. e., stoves with a jacket or envelope around them, so that pure air having been led from the outside through a pipe may pass between the hot stove and the jacket and be poured into the room warm. This method is simple and reasonably cheap, and should always be used if a better plan be too expensive. Then at every recess the windows should be opened and the air changed in that way too.

I hope you will forgive my trespassing so long upon your patience, but this matter of the air we breathe is a vital one, and one that is sadly neglected, and if I have succeeded in setting you to thinking about it, I shall feel no compunction for having bored you.

"DRINKING WATER IN ITS RELATION TO HEALTH."

READ AT THE WINSTON HEALTH CONFERENCE BY J. L. LUDLOW, M. AM.
SOC., C. E., OF WINSTON.

Among all the elements that creation has provided for promoting the health and happiness of mankind, there is none more important than water. It is one of the three essentials to human existence. Air, food and water, all must be supplied or life can no longer be maintained. Used in an impure, abnormal condition, life in an enfeebled state may be sustained for a time, but for the promotion of human life in health, it is absolutely imperative that these essential elements shall be provided in suitable quantity and in a high standard of purity.

Elements that have been so abundantly provided by nature, and are of such common use as air and water, we are prone to take as they may be found, without a thought as to their purity and fitness for the sustenance of life. In this life we get but little for the asking and less for the taking: but, for all we get that is good to have, we must expend a certain amount of energy, either of muscle or of brain.

Nature is very lavish in yielding abundant rewards to the tillers in her vineyard, yet it is manifest that she does not intend that any of her elements, needed in the perfect promotion of human life in health and happiness, shall be free, but rather for the furtherance of the ennobling purposes of human life, life shall be a constant struggle to yield proper tribute to her precepts. And so air and water, so universally distributed and apparently so free, are not intended to be freely given in a condition most conducive to health and happiness, but, in order to secure them in a proper state of purity, we must observe hygienic laws and exert a certain amount of intelligent effort.

In the few minutes allotted to the reading of this paper, it shall be my purpose to impress upon your minds the very important relation that exists between the health of the individual and of the community and the degree of purity of the water that is used for drinking and other dietetic purposes: also to indicate a line of intelligent effort for securing and maintaining a proper standard of purity in the water supply.

The physicians tell us that to maintain our bodies in health and physical comfort we must have pure blood. Figuratively speaking, "blood is life," and literally it is the medium by and through which life is promoted and sustained in the animal kingdom. The nutritious elements of the food that is eaten, are first absorbed into the blood and then transformed into muscle, bone and brain. When the blood is pure and healthy this process of transforming the potential energy of food into kinetic energy of physical health and vigor, goes on in the easy manner provided in nature, and all the joys of physical life are fully realized.

Chemistry teaches us that in composition about eighty (80) per cent of the blood is water. This must be constantly replenished in order that the blood may continue its mission of supplying nutrition to the various parts of the body.

The water that we drink is directly assimilated into the blood, and if it contain the bacteria of zymotic disease, infection is almost certain to speedily follow. If one has built up a strong, vigorous constitution by the habitual use of pure and wholesome drinking water, and by the proper observance of hygienic laws, he may be able to successfully resist an occasional attack of pathogenic bacteria, but even this affords no certain immunity, and the only reliable and certain prophylactic measure against infection from water-borne disease germs, is that they shall never be taken into the human system.

The evil effect of drinking impure water is not always immediately manifest, nor general to a community. A few isolated, apparently sporadic cases of typhoid fever may not be a just cause for condemning a public water supply, neither can its failure to spread in epidemic proportions be taken as satisfactory evidence that the typhoid bacillus was not transmitted in the few cases through the drinking water.

The knowledge that many of the common diseases are caused by minute organisms called bacteria, is of comparatively recent origin, consequently it is a field of scientific research not yet fully exploited. Of the so-called water-borne diseases, no scientist will as yet claim to give a complete list. The fact that the specific bacteria of certain diseases have never been found in water can not be taken as a proof of their absence. In the Franklands' work on "Micro-organisms in Water," published in 1894, there is found a list of two hundred (200) species, including about 20 of the pathogenic varieties that had been differentiated up to that time. Others have since been added, and it is not unlikely that still others will be found, including the specific germs of diseases, which at present are not suspected of having any connection with the water that is used for dietetic and hygienic purposes. Investigators whose eminence commands profound respect, are already on record as believing that the bacillus of diphtheria should be added to the list of water bacteria.

The bacillus of typhoid fever is said to be quite difficult to distinguish from some other species, and it is, but seldom actually found in water, yet there is abundant evidence of effect that it is present, witness the many cases of water known to be polluted by the *dejecta* from typhoid patients entering the pipes of a public water supply, passing into the homes and used for drinking and other dietetic purposes, and then emerging in many caskets of its victims, as for instance the well-known case of the little mountain town Plymouth, Penn., with which many of you are doubtless familiar. And, it might be added, that during the past twenty years not less than twenty severe epidemics of typhoid

fever in cities and towns, in the United States, have been directly traced to infection in public or private water supplies.

Investigators into the prophylactic results of improved water supplies and other sanitary measures have devoted their attention principally to typhoid fever, hence statistical knowledge of this disease is much more abundant and reliable than of any other of the well-known zymotic diseases. But it may be confidently asserted as a well-established proposition, that *the relation of improved water supplies and other sanitary measures to the general health of the people, is accurately indexed by the effect of such measures upon typhoid mortality rates.* And I would ask your attention for a few minutes to what has been accomplished in the reduction of sickness and mortality from this disease, by means of improving the quality of the water used for dietetic and hygienic purposes.

In the State of Massachusetts the public water supplies are, by legislative enactment, directly under the care and scrutiny of the State Board of Health, and a most excellent example of intelligent effort toward securing pure and wholesome water for the people, is found in the labors and accomplishments of the individual and collective members of that Board. In the 1896 annual report of that Board in "A forty-year summary of the vital statistics of the State," by the Secretary, Dr. Samuel W. Abbott, is found the following statement: "It is interesting to note the decline in the typhoid fever death-rate in its general coincidence throughout the State. * * * * The death-rate from this cause has generally fallen as the per cent of the population supplied with public water has risen, for the reason that the majority of deaths from typhoid fever have occurred among communities not supplied with public water."

Mr. James H. Fuertes, M. Am. Soc. C. E., in a recent work entitled "Water and Public Health," has collected the typhoid fever mortality statistics of a large number of American and European cities, having a combined population of 33,000,000, for the years 1890 to 1895. An analysis of these statistics gives some interesting and valuable information, clearly and unmistakably establishing a direct relation between the typhoid mortality and the degree of impurity of the water that is supplied for drinking and other dietetic purposes. In the group of cities having their source of water supply in mountain springs the annual typhoid mortality is but 7.05 per 100,000 of population; with supplies from naturally polluted sources but effectively filtered by modern methods, the annual typhoid mortality 15.53 per 100,000; with sources of supply from natural ground water a rate of 23.24 per 100,000; with supplies of unfiltered water from large normal rivers a mortality rate of 29.37; with supplies drawn from upland streams and springs, in populous valleys, an annual typhoid mortality rate of 48.45 per 100,000; with sources of supply, polluted rivers and wells, an annual typhoid mortality

rate of 68.83 per 100,000. Thus, with the ascending scale of purity in public water supply there is plainly marked a corresponding descending scale of typhoid mortality. The same work also shows diagrammatically that the change in source of water supply of the city of Chicago, from near the shore of the lake to the 4-mile intake, was attended by an immediate decrease in the annual typhoid mortality from more than 100 to less than 30 per 100,000. The change in the source of water supply of Newark, N. J., from the polluted Passaic to the Pequannock River marked an immediate decrease in the annual typhoid mortality from 80 to 20 per 100,000 of population. A change from the old system of filtration to new and modern filters carefully operated in the city of Zurich, has reduced the annual typhoid mortality from 44 to less than 10 per 100,000 of population.

The experience of the city of Lawrence, Mass., with a population of 55,000 furnishes a striking example of the efficacy of an improved water supply. This city is situated upon and takes its water supply from the Merrimac River. On the same river, but nine miles above, is situated the city of Lowell, with a population of 80,000. The public water supply of Lawrence was built in 1873-75. and for several years decreased typhoid mortality is reported to have marked the change from ordinary dug well-water to river supply. About the year 1890, however, it was found that the typhoid mortality in the cities of Lowell and Lawrence was about three times that in other cities of the State, and the most virulent outbreaks in Lawrence followed, about a month after similar but less severe outbreaks in Lowell. This being a continuing condition year after year it was manifest that the cause was in the water supply rendered impure by the sewerage of Lowell and other cities farther up the river. No other source of water supply being available within the ability of the city to procure, the only remedy lay in providing some means of purifying the water of the Merrimac. This the State Board of Health undertook to do, and after a very thorough and exhaustive series of experiments, advised the city authorities of their readiness to advise them how to decrease the alarming typhoid mortality by means of improving the water supply by sand-bed filtration. The filter plant was established and put in operation in September, 1893, with the immediate result of eliminating more than 98 per cent of the bacteria from the river water and a reduction in typhoid mortality from 50 in 1892 to 24 in 1894, and in 1896 to 10, a net reduction of 80 per cent, directly due to the effective filtration of the water supply.

I might add many more pages of testimony that prove the direct relation between the health of the people and the character of their drinking water, but I trust to have already cited enough to win your belief in the doctrine, if, indeed, I was justified in the doubt of your opinion before I began. I hope, though, that I have not raised the

value of wine and beer license in the community by calling your attention to the dangers that lurk in Adam's wholesome beverage, for as a fact, though many dangers attend the use of impure and unwholesome water, there is little reason and less excuse for this or any other community to use that kind of water, thanks to the modern investigations and accomplishments of the chemist, the bacteriologist and the engineer.

It becomes logical now to inquire as to wherein lies the security against the dangers of impure water. Absolutely pure water does not exist in nature, and as a rule, the more impure the water the easier it is to get, yet a water supply of hygienic and wholesome purity can always be had by means of a properly directed, intelligent effort, whether it be required for a suburban residence, a village, town or city. To secure a water supply, having a proper degree of purity for drinking and dietetic purposes, there are two ways open to us, either we must take it from a source removed from any inherent or surrounding conditions of contaminating influence, or in the absence of such a source being available we should choose the one least liable to contamination and invest the water that is taken with the required standard of purity by means of modern methods of purification, simply the making of an intelligent effort. In this effort precedence should be given to the selection of the source of supply, and next to the methods of artificial purification, to be copied as closely as practicable after nature's own manner of purifying polluted water.

It is well known that a continuing source of water supply must come primarily from the rainfall. The choice lies in selecting a medium through which rainfall shall be collected and applied to our use. This medium may be wells, springs, small streams, lakes or rivers. Either of these may furnish a supply of satisfactory hygienic purity, or a supply that is totally unfit for drinking or dietetic purposes, according to the conditions surrounding the point from which the water is taken. A very common source of drinking water supply is the common dug well, sunk a few feet in the drift overlying the primary formation, and drawing their supply from the water that percolates through the soil within a small radius immediately surrounding them. This primitive means of securing a water supply derives its importance for consideration in this paper from the fact that it is the main dependence of many small villages and too often of good-sized towns as well. But a few moments thought must convince any one of the great dangers attached to using water from such a source in the midst of accumulated habitations. In isolated places where the soil surrounding the wells is maintained in its primitive purity a very good quality of water may be secured, but it is well known that the soil in towns and villages being nature's laboratory for transforming the effete substances of animal life back into its original elements must become surcharged with such

impurities, and a veritable bed of bacteria, both of harmless and pathogenic varieties, which are readily taken up by the percolating water and carried directly to the wells, and the water, instead of being pure and wholesome, becomes very foul, and its use for dietetic purposes is attended with great danger. The popular impression that well water, of good taste and clear color, is pure and wholesome is quite as erroneous as it is popular. Water to be pure and wholesome should be tasteless and colorless, yet absence of color is by no means a guarantee of its purity. It may be as clear and sparkling, as bright and transparent, as the tiny dewdrop when touched by the first kiss of the morning sun, yet be laden with the most dangerous and deadly bacilli. These subtle enemies to human life and health, give to the untutored eye no warning of their presence, but their obscurity is so complete that only the trained expert can detect them.

So much data has been observed and collected showing the evil effects of well water upon the lives and health of people in congregated communities that the extreme danger of such a source of domestic supply is no longer recognized as an argumentative proposition. "The old oaken bucket, the iron-bound bucket, the moss-covered bucket that hung in the well," has long since been known to have constituted the stroke oar of many a little barque that prematurely plied the river Jordan.

The same conditions that render well water unfit for domestic use, have a similar effect upon spring waters, and spring water can only be considered a safe supply when surrounded by conditions that render them exempt from contamination.

Shallow driven wells in populous valleys are likely to yield a supply totally unfit for dietetic purposes. Artesian wells that pass through one or more impervious formations, may be used with a reasonable degree of confidence, but the water should be first analyzed for mineral impurities, and some information as to their source will probably be gained by a careful study of the analysis.

Owing to the large quantity of water required for a sufficient supply to cities and towns, dependence must be largely placed in the rivers and smaller flowing streams, and in a country so sparsely populated as North Carolina, they would seem to furnish a satisfactory solution to the water supply problem. The smaller streams, wisely selected, carefully guarded, and intelligently applied, will yield a pure and wholesome water supply, and in a large portion of the area of this State they constitute the most available and desirable source of supply. As a rule though, they must not be taken as they are found, but an intelligent effort must be made to conserve and invest them with the high standard of purity to which they are easily susceptible. How shall this be done? In the process of percolating through clean and unpolluted soil, and gushing forth in the pure mountain springs and streams, nature

marks out the path that we are to follow. Man's imitation of this process is called filtration. Experience of years, principally in the cities of Europe, but largely in this country during the past few years, has proven beyond any question, the efficiency of filtration in rendering a water supply pure and wholesome even where it has been exposed to very serious and excessive impurities.

While I shall devote a few pages to pointing out the abundant security against the evils of impure drinking water, that is furnished by modern filtration. I must warn you against the danger attending dependence upon a water supply simply because it is said to be filtered, and that may in fact go through a process of so-called filtration. As with men there are wise and otherwise, so there is effective filtration and other filtration. Many people, upon being told that their water supply is filtered, are entirely satisfied without pursuing the matter further, but if the water supply is known or even suspected of being exposed to such pollution as to require filtration to render it pure and wholesome, we should demand to know how it is filtered, or at least what is the specific character of the filtrate as to bacterial impurities. A word of warning should also be said in regard to the so-called domestic filters, of which many types are offered to credulous but misguided people. There may be some types of domestic filters possessing merit, but as a rule they are absolutely useless, and in many cases worse than useless. Any security that we may feel by their use must be a matter of faith and not of works. Artificial purification of water supplies by means of filtration is divided into two systems, viz., mechanical filtration and slow sand-bed filtration; the distinguishing characteristics of the two methods are that one runs contrary to nature's plan, and the other undertakes to copy it. Mechanical filtration passes the water through the filtering material very rapidly, depending upon some coagulant, usually sulphate of alumina, being previously introduced, thus rendering the bacterial and other impurities susceptible to the straining process of rapid filtration. In the sand-bed filtration the purpose is to pass the water through the filtering material very slowly, copying as nearly as it can be known the actual velocity through the drift in natural filtration of ground waters. The most efficient velocity in sand-bed filtration varies with different waters and with different degrees of impurity. One great point of merit for sand-bed filtration is that the rate of filtration, to give the best results, can be readily determined by experiment, and the filter can be made to operate automatically and prevent a more rapid rate of filtration. In mechanical filtration it is not probable that any biologic action takes place, but that the operation is purely a straining process. With certain waters very good results may be accomplished if operated under intelligent supervision. The variable factor is the amount of alum required by the particular water to give a satisfactory filtrate. In many waters it would

doubtless be necessary to use such an amount of alum that the filtrate would contain alum in solution to such an extent as to render the water less fit for domestic consumption than it was before filtration.

In sand-bed filtration, the straining process of the mechanical filter is supplemented by nature's process of biologic action wherein the putrefactive bacteria yield to the attacks of the nitrifiers, and practically all forms of organic impurities are eliminated.

The matter of selecting the best type and arrangement of filter to suit the conditions of any particular water supply being purely an engineering problem and not necessarily pertinent to this occasion. I will forego pursuing the subject farther except to call attention to the possibilities of filtration as illustrated in the case of four cities, two having typical supplies of mountain spring water, the other two having in operation typical sand-bed filtration from river supplies contaminated by sewage and surface drainage.

The cities of Vienna and Munich take their water supplies respectively from springs in the Austrian Alps sixty miles away and from the Mangfall Thal thirty miles away: the typhoid mortality per annum per 100,000 of population for seven years (from 1890 to 1896) was 6.55 and 5.94. The cities of Rotterdam and Berlin using the river water filtered, the corresponding mortality rates were 5.7 and 7.14. Thus it is seen that the polluted river water is made practically as wholesome as that from the distant mountain springs. As a preliminary to filtration, subsidence in large reservoirs aids very much in securing good results. Frequent and thorough sanitary inspection of the watershed and the prevention of avoidable pollution is a most important and effective adjunct to water purification. Frequent and thorough chemical analyses and bacteriological examinations are essential to intelligent operation of a filter plant, and furnish information that the water consumers should demand.

The inquiry may arise as to why I have considered the matter in the foregoing pages to be of interest to this audience and pertinent to this Health Conference. My apology, if one is needed, may be found in the last biennial report of the State Board of Health, pages 117 to 119, a table "showing causes of death during the year 1896, as reported to the Secretary of the Board by the health officers of twenty-four towns and cities in this State." That report shows that from a total population of 126,785 there were recorded 134 deaths from typhoid fever, equivalent to the astounding rate of 106 per 100,000 of population. Those of you who have followed closely the reading of this paper, and have noted the statistics of typhoid mortality given, must have been impressed with the thought, that an annual typhoid mortality of more than 20 per 100,000 is inexcusable, if not reprehensible; what must we say then of an average rate of mortality, from typhoid fever, in our cities and towns of 106 per 100,000 of population? Aye, and even worse than that,

three of our most progressive cities, viz., Winston, Salisbury and Charlotte head the list with a typhoid mortality equivalent to the appalling rate of 160 per 100,000 population for the two first named and 135 for the last. Does this show any relation between the health of the people and the character of their drinking water? For answer I will refer you to some other data gathered by the State Board of Health and published in the monthly "Bulletin" of June, 1898, viz., chemical analyses and bacteriological examinations of samples from the water supplied by the fifteen public supplies in the State. These examinations reveal the fact that at least ten of these fifteen public supplies showed bacterial impurities very much in excess of the easily reached and liberal standard of purified water, viz. 100 bacteria per C. C., and in case of the three towns heading the list in typhoid mortality in 1896, Salisbury's water supply shows 150 bacteria per C. C., Charlotte's 425, and Winston's 880 bacteria per C. C.

Is the matter of purification of public water supplies a live issue, and one of interest to this audience, and to the people of North Carolina? Ask the parents, the widows and orphans of the 134 victims of typhoid bacillus in the year 1896 alone; ask the 1,340 persons stricken with the same disease, and who, though they recovered, endured suffering of such intensity that even death would have been, in many cases, a welcome relief.

Can it be prevented? For answer, I invite you to study the results where the water used for drinking and dietetic purposes has been rendered hygienically pure by intelligent efforts towards artificial purification.

Gentlemen of the State Board of Health, I wish to bear enthusiastic testimony to the great service that the Board has rendered the State, and the great good that your labors are now accomplishing, but I want to say to you that no man, or set of men, have ever had such an opportunity of serving their people and their State as opens to you in making a vigorous and unrelenting campaign for the purity of water supplies. I am aware that the present legal status of the Board enables you only to advise, and that your recommendations must frequently meet the usual reception and treatment of unsought advice. You should be relieved of this condition and be vested by legislative enactment with authority to make your directions mandatory, and if necessary have the entire machinery of the State government to enforce their proper observance. Can the State afford to clothe you with this authority and give you the necessary appropriation? I would refer you to the loss in one year alone of 134 lives from typhoid fever, of which at least 110 could and should have been prevented. Leaving out of consideration, for the moment, the duty that the State owes to the people in the protection of their lives, in the pursuit of happiness, and viewing the situation from the mercenary standpoint alone, by placing the low average

valuation upon the lives of the victims at \$3,000, and counting the cost from loss of time, nursing and medical attendance of the cases that recovered at \$75 each, we find a financial loss to the State of \$430,000 for the one year alone, and from but one of the preventable diseases. Gentlemen, the logical question is not can the State afford to support you, but rather, can she afford to withhold her support from you, and such a liberal support that you will be enabled to take up the question of pure water supply, together with your other labors, in a thorough and effective manner, and secure to the people that which they have a right to demand from the State, immunity from preventable diseases.

NOTE.—Upon concluding the reading of the above paper, Dr. Lewis, the Secretary of the Board, called attention to the fact that the sample of water from the Winston public supply, containing 880 bacteria per C. C., had not been packed in ice in shipping it to the bacteriologist, and therefore was not a fair test of bacterial impurity. As bearing even more directly, however, upon the affirmed relation of the high typhoid mortality of 1896, with the bacterial impurities of the public water supply, I would refer to an analysis made in September of that year, report of which is found on page 80 of the Sixth Biennial Report of the State Board of Health, by Dr. Pate, bacteriologist of the Board, as follows:

“To Dr. Bynum, Winston :

“The sample of water collected by you September 2d, from the public water supply of Winston, contains 3,150 bacteria to the cubic centimeter of water. It ferments both glucose and lactose bouillon, but I was unable to isolate the fermenting bacteria. I consider the water suspicious.

Yours truly,

W. T. PATE.”

It should be added, that promptly upon being informed of the result of the above analysis, the city authorities made an effort to eliminate the most evident causes of pollution, and an analysis made by Dr. Pate in December following, showed a reduction in bacteria to 420 per C. C.; not a good standard, it is true, but a very marked improvement over the condition indicated by the September analysis.

SMALL-POX AND VACCINATION FOR PLAIN PEOPLE.

BY ONE OF THEM.

READ AT THE WINSTON HEALTH CONFERENCE BY COL. A. W. SHAFFER,
MEMBER OF THE BOARD.

"Small-pox," says the great American lexicographer, "is an exanthematic disease, consisting of a constitutional febrile affection and a cutaneous eruption. The cutaneous eruption is first a papule, the top of which become a vesicle, then a pustule and finally a thick crust, which sloughs after a certain period, leaving a pit or scar. The disease is propagated exclusively by contagion or infection, is very dangerous, and is technically called *Variola*."

"Inoculation" consists in the communication of small-pox by inserting the pure virus of the disease under the skin or in the flesh of a person in health.

"Vaccination," says the same authority, "is the act or practice of inoculating persons with the virus of cow-pox; from *vacca*, a cow."

The origin of small-pox is unknown, but it comes down to us through the Asiatic continent from the earliest records of antiquity, and within 200 years of our era was confounded with measles, scarlet fever, roseola, and like kindred diseases. It is certainly one of the most loathsome, and, until the dawn of the 19th century, was one of the most fatal, contagious and epidemic diseases that ever afflicted the human race. Every three to five years, before its predecessor had run its course, it swept over the earth like the sword of the destroying angel over the hosts of Seneccharib. It entered alike the palace of the great and the hovel of the poor, respecting neither age, sex or condition. Filth was no cause, cleanliness no preventive and treatment no cure. Great kings and royal princes, stately women of high degree and matchless beauty, and babes at the mother's breast fell alike before its destroying blast and were disfigured and deformed for life, or thrust into the same hole with the filthy carcasses of their meanest subjects: husbands deserted their wives, mothers abandoned their children and fled to the wild desert and the pathless woods, only to die miserably and alone of hunger and thirst, or the same dreadful scourge; whole nations, tribes and peoples were extinguished in its progress, and it became an axiom among men in the first century of the Christian era that all men everywhere, every human being born into the world, must sometime take their turn and wrestle with the vile destroyer for their lives, from which few ever escaped.

Since the discovery and settlement of our own continent in the last decade of the 15th century, it has left its deadly trail everywhere, and

especially among the aboriginal inhabitants, who knew nothing of its nature, treatment or cure. In 1507 whole tribes were extinguished in the West Indies: 3,500,000 were suddenly destroyed in Mexico, leaving none to bury the dead; entire races of men disappeared in Brazil in 1563, and 1,000,000 in Quito, a province of Chili, about the same time: of 12,000,000 American Indians, it is estimated that six to seven million died of small-pox, and it is a matter of history that in one outbreak every individual was swept away. Great epidemics of small-pox have decimated our principal cities and ravaged the rural districts more or less frequently everywhere, but not with the virulence of former times, because centuries of devoted labor, investigation and experiment among all civilized nations has shorn its Samsonian locks and curbed its high career. Indeed, it may go without saying, that even in the dark ages of ignorance and superstition, a disease so universal, so loathsome and so fatal—a disease that made no discrimination, but attacked alike the king on his throne, the pope in his robes of State, the warrior in his coat of mail, the beggar in his rags, and the slave chained to his daily task—was not permitted to run its deadly course without the armed hosts of Æsculapius on its heels. Ancient writers describe the invocation of special deities to ward off the dreadful visitation by the Brahmins of India, the priests of Egypt, Greece and Rome, and even since the dawn of the Christian era we read of miraculous cures through prayer and sacrifice, the laying on of hands and the exhibition of sacred relics: but the patients were royal patients; the doctors were monkish priests; the *locus in quo* were Catholic monasteries, and the miraculous cures existed only in the credulous brain of the Friars and the laity of the church.

It is the "*Flowery Kingdom*" and the "*Heathen Chinees*" that lays claim to the first discovery or invention, in A. D. 590, of the art or device of inoculation of the pure virus of small-pox from a human victim of the disease, under the skin or in the flesh of a person in perfect health—perhaps on the theory of the old adage—that "the hair of the mad dog will cure his bite." Of course it reproduced itself—small-pox, pure and simple, but in a modified, or discreet form as contradistinguished from the confluent or more fatal form, and as the virus became attenuated by frequent renewals obtained from the subjects of successful inoculation, the virulence of the disease abated wherever inoculation was general. Nevertheless, it was never popular, and became general nowhere, save on compulsion. The disease was so little understood by the masses; the appearance of its victims so repulsive; their necessary isolation from family and friends so cruel, and its results so fatal, that everything savoring so much of the disease as the application of its own product to the human body was regarded as little better than the foul disease itself.

Moreover, great masses of ignorant and superstitious people be-

lieved that small-pox was a visitation from God, in punishment for sin, which no human skill could mitigate or evade; and as late as the last century, there was a common saying, long since ripened into a proverb, that there were "kinds of small-pox that a nurse couldn't kill and a doctor couldn't cure," and the epigram of Ben Jonson—

"Envious and foul disease, could there not be
One beauty in an age, and free from thee?"

would seem to confirm the tale of its universal prevalence.

Moreover, there was another, and, perhaps, not the least potent objection to inoculation with the virus of small-pox, renewed for generations from the human pustule. It was not only said to induce spotted fever, rash, consumption, ophthalmia and erysipelas, but it was boldly alleged and stoutly maintained by physicians opposed to the practice, and believed by great masses of the people, that humanized small-pox virus was charged with the poison of every infectious and contagious disease lurking in the blood of the human subject from which it was taken, and was transmitted by inoculation to innocent persons in perfect health; and among these were scrofula, cancer, leprosy, syphilis, scurvy, tuberculosis, and a score of kindred diseases scarcely less loathsome, and little more amenable to treatment, than the disease they sought to escape.

But it was so ordered as to fall to the lot of glorious woman to voice the key-note of investigation and experiment, from which arose an antagonist destined to assail, circumvent and destroy the pestilential scourge. In or about the year 1768, a young woman entered the office of a country practitioner in Gloucester, England, and in the course of conversation, in which small-pox was mentioned, she said, "*I can not take that disease, for I have had cow-pox!*" If the country doctor noticed the remark, it has not come down to us, but it sank deep into the active brain of his young apprentice, and long afterwards, when he had served his term and become himself a doctor, it became the subject of his deepest cogitations. He introduced it in conversation with his personal friends; discussed it in the assemblies of his profession; instituted inquiries among the dairy people, and gave to investigation and experiment the hours commonly devoted to rest and recreation. His experiments consisted mainly in the application of the test of small-pox inoculations to persons who had, at some times in their lives, had the cow-pox; (2) in transferring the virus of small-pox direct from the cow's teats or udder to the human subject in health; (3) in transferring the resulting product from arm to arm of different persons in health. He published the result in London in 1799, and of other and further experiments and conclusions in 1800, which, briefly stated, are these: That the pustular eruption found on the udder of the cow (which

he named *variola vaccinae*), was not spread by atmospheric infection, or followed by eruption, and when transferred from the animal to the human subject was an absolute preventive of small-pox, which only accidental circumstances could develop into a violent disease; and finally, that the cow, being exempt from the kindred diseases heretofore cited as an argument against inoculation by humanized small-pox virus, the lymph so obtained could not transmit those diseases; and a hundred years of patient investigation, careful experiment and faithful practice has set the seal of truth to every one of those conclusions.

The name of the country practitioner who heard, but took no note of the declaration of immunity heretofore cited, died and was buried with him; and that of the woman who was *immune* is enveloped in doubt and uncertainty, but the name of *Edward Jenner*, the apprentice-student, the sometime doctor, the devoted specialist and the great benefactor of mankind, will ring down the corridors of Time 'till time shall be no more.

Such is vaccination, and such is its origin, development and use to this day. It is true, as in every profession, that there be doctors and doctors, great and small doctors—sublime in their unselfish devotion to all the ethics of the profession, or contemptible in their ignorance and inefficiency. These last are mere quacks and impostors, who find their victims among the ignorant, the credulous and unwary; and it is not to be denied that through these come the use of vitiated lymph, taken from the subjects in whose blood lies, active or dormant, the germs of the kindred diseases so feared by the masses of the people. But such is not the general practice, nor can it ever become so. Small-pox virus—whether in all its original strength and purity, or in its humanized, attenuated, and possible corrupt form—has passed away forever. Nor is the humanized lymph of cow-pox any longer used, save in case of a great small-pox epidemic and a temporary exhaustion of the normal sources of supply—as in case of the war of 1861-'65, when, at least at the South, the animal lymph was absolutely unobtainable, and everything having the semblance of scab or pus passed for vaccine; anything with two hands and a blade or point, for a vaccinator, and every filthy sore at the point of abrasion, for a successful vaccination, with all its attendant disastrous results. No wonder that the memory of that harvest of vile diseases still burns in the hearts and perverts the brains of the fathers and mothers of this later generation! Less wonder if Reason has not resumed her throne among the surviving victims and witnesses of that calamitous era, and little blame if the ignorant and unlearned, unknowing what they do, stand aloof from vaccination, preferring that the sons and daughters of their love shall take their chances of the known terrors of the fell de-

stroyer, to undergo its terrible suffering, its horrible distortion, its severance from home and friends, its merciless consignment to desolate pest-houses, its miserable death and hasty burial, unattended, unwept, unhonored and unsung—rather than that they should suffer the insignificant pains and inconvenience of vaccination, with its remote peril of inoculation of unknown kindred diseases.

But it ought not to be so, because the day of that peril is past, never more to return. Anti-voluntary and anti-compulsory vaccination ought never to be heard of again among any class or condition of men—for it is the only safe, sure and inoffensive safeguard ever discovered or invented against the vilest and most destructive disease that ever afflicted mankind. For more than a quarter of a century the transmission of kindred diseases through the medium of cow-pox vaccination has been practically impossible, and the danger of any such transmission exists only in the minds of those persons who are ignorant of the great progress made in the cultivation, preservation, use and treatment of the virus or lymph. He who still doubts, but is willing to be convinced, should study the very interesting, minute and exhaustive "*Instructions to Public Vaccinators*," issued by the Medical Department of the Government Board in 1887, and now, as then, in full force and practice; which, but for its great length, and the limitation of this paper, would be here inserted. Suffice it to say, that the virus of cow-pox is now rarely taken from the cow—though universally conceded to be *immune* from kindred human diseases—but from the healthy calf, or the young heifer, and not from sporadic subjects, but from animals separated from dam and herd from birth; these are artificially inoculated with the pure cultivated lymph of cow-pox; the product taken from them with the utmost care and distributed under seal to the profession by learned and skillful men, who devote their lives and fortunes exclusively to this business. There are many vaccine farms and vaccine herds in full operation in the several States and Canada, and others in course of formation, and it is exceedingly unlikely that another dearth of pure bovine vaccine will occur before small-pox, and all its attendant evils, is eradicated from the earth.

Surely it is time that the prejudice engendered by the bitter experience of by-gone ignorance, inefficiency and unavoidable failure of pure material, should be abandoned and forgotten, and all men and women, too, everywhere, should unite in a resistless crusade for voluntary and compulsory vaccination, and *against* the most persistent, abhorrent and fatal malady known to man—small-pox. *And so mote it be.*

BOVINE TUBERCULOSIS.

READ AT THE WINSTON HEALTH CONFERENCE BY COOPER CURTICE, D. V. S., M. D., VETERINARIAN TO THE STATE EXPERIMENT STATION.

Tuberculosis in man known under the names consumption, phthisis, tabes mesenterica, tubercular laryngitis, meningitis, joint diseases, et cætera, has its counterpart in confined animals, notably those of the menagerie and dairy. It is of that form existing in cattle, *bovine tuberculosis*, and more especially of its sanitary and commercial aspects that I am about to present to and discuss with you.

The one character by which the disease may be recognized in the organs of the carcass is the presence of tubercles; these are little knots varying from the size of a pin-head to aggregations of several inches diameter, consisting of yellowish or orange yellow, cheesy material. Often the larger masses lose their firm consistency, become softened and filled with creamy pus or serous fluid.

In cases of doubt as to the origin of formation of a particular mass which differs in some of its appearances from those of the ordinary form, resort must be had to the microscope for determining the presence of the plant germ, which produces the disease, *bacillus tuberculosis* and to the inoculation of test animals which reproduces the disease in them.

The layman learns to distinguish tubercles in a single demonstration on a diseased animal. Doubtful cases must be referred to the expert.

The tubercle is the result of a single germ or plant arriving in healthy tissue and its subsequent multiplication into countless myriads. Growth, as all are aware, is the result of living organisms appropriating food to themselves from their surroundings, converting it into new tissues, giving off of waste products and multiplying themselves into new individuals.

The arrival of a single germ within the economy of the cow may not disease her, and indeed the subsequent formations of large tubercles may make little systemic or general disturbance noticeable to untrained observers. Yet the grave death rate in tuberculous herds is but the termination of the further advance of the bacillar multiplication.

The germs having entered into and been arrested in their movements through the body, arrive at some point suitable for growth. In doing this they take substance from the invaded cells and add excreta, which are poisons to them. They invade new tissues by their increase. All this irritates the cells composing the tissues.

makes them grow and increase in number. This, together with other pathologic changes, finally results in so disturbing circulation that the interiors of these centers of disturbance are deprived of their share of nutrient fluid and death and destruction of the tissues follow. The caseous centers, the product of these processes, is what the layman discovers. The bacilli growing in the newly attacked surrounding tissue is what the microscopist sees; the single bacillus, or at least the few bacilli scattered through a considerable mass, become demonstrated only in experimental animals; the poisonous products given into the blood, together with those changes in the nutritive quality of the blood affected by the withdrawal of some of its constituents by the hosts of bacilli, seem only discoverable by the evident dejection of the invaded animal.

Tuberculosis, as compared with other virulent germ diseases, is slow in its effects. Many plagues exterminate individuals and herds inside of a few days or weeks after the first outbreak, but this one takes anywhere from seventeen days to ten years to arrive at the same results. The extremely short time of little over two weeks in which a healthy yearling bull was killed by the disease was reported by Dr. Theobald Smith, of the Massachusetts Board of Health, in an inoculation experiment. *Jours. Exp. Med.* Vol III, Nos. 4 and 5, 1898. Instances of calves dying have been frequently reported. Most deaths occur in cattle from one and a half to six years of age in affected herds, and in such few young animals introduced or bred in the herd live longer than six years. Older affected cattle seem to drag out an existence, which is only mercifully terminated by the axe. Besides the effect on the health of affected cattle, that on the products must also be considered. Cattle owners whom I met in the course of my work in New York State have frequently demonstrated to me that the disease caused diminished amount of milk and certainly rendered the cattle too poor to be sold for beef, even had they desired. One said that the reduction of the average butter capacity was from 300 pounds to 150 pounds in less than three years, and the feeding had been increased far beyond profitable practice.

In a bulletin in the course of preparation for the State Experiment Station, it will be shown how the Experiment Station herd became seriously infected within two years and the disease entirely eradicated. The arrest of the disease in the State College herd will also be given. Without exacting proof of the existence of this disease in this State until the issuance of the bulletin, I beg that the audience will permit me to assume its presence and proceed to discuss other phases.

In accepting the statement that tuberculosis is the result of growth of germs, a fact long proven by so many positive experiments that

more are a loss of time, the possibilities of complete eradication in cattle at once arise.

Since no living thing comes into existence of itself, germs can not arise spontaneously in cattle. They are the product of other germs just the same as the potato arises from other potatoes; as the oyster descends from other oysters, and so on through all nature.

The tubercle germ has been found in new-born calves in so remarkably few cases as to warrant the statement, that it is hardly ever transmitted before birth, and that the possibility of its transmission by such method in any devised plan of preventing the spread of tuberculosis is not worth consideration. In tuberculous herds calves at birth are free from the germs. If this statement be true in part, if not in entirety, and if these calves become diseased, as they surely do under the usual care, it is evident that the germ must get into them in some way.

Under any conditions, the tubercle bacillus is a passive organism; it is simply a little rod of cellulose, exceedingly minute in size, which has living properties. It can not move of itself, even in liquids. Collective germs have, however, a method of extending their habitat; but this is on the same plan that the beginning germ or bud of a tall tree gives rise to stalks and successive buds until the last may be 350 feet in the air; or that a strawberry plant may be the descendent of another rods away, having arrived there by the runners of the parent plants having reached out in its direction. However, the bacillus has no stem, just the rod which grows divides into two, which grow to an equal size and then divide, and so on to infinity.

Tubercle bacilli have not yet been found to have arisen from any other source than animal bodies, and those in cattle have not yet been proven in any considerable number of cases to have arisen from any other animal than other cattle. Indeed, in one of the most comprehensive experiments yet made upon the subject, Dr. Th. Smith, O. C., has demonstrated in so far as such an experiment can do so, that the bacillus from man has little power to effect damage in cattle even when transplanted or inoculated under the most favorable conditions, and under the same conditions in which the bovine germs wrought fearful havoc.

Since the germs from man, the ever constant attendant of cattle, have been proven to be so inert, little may be feared from other animals that may be found on our farms, especially as some of these almost never have the disease, and those that do, contract it from cattle and may be readily disposed of without loss. Again, I write as one giving the results of years of work, but not presenting the data obtained by scores of writers.

If tubercle bacilli, which infect cattle, can only come from other cattle, by what avenues do they effect their escape and by what do

they gain entrance? If it is true that they can not move of themselves, it is evident that they must be moved, or carried to the places they arrive at.

Bacilli leave the body generally with mucus coughed up from the lungs and ejected through the nostrils or mouth. The contaminated mucus may be swallowed when the germs may be cast off in the intestinal ejecta. The escape of germs from the vagina is rare, yet sufficiently common in advanced cases of tuberculosis as to warrant their destruction on this account alone. The escape of germs from the lungs occurs when a tubercle, whatever be its size, minute or large, is so situated that it becomes disintegrated and its soft, creamy pus contents empty into the air passages. In herds that I have examined, from one quarter to one-half of the condemned animals have had pulmonary abscesses in different stages of development which were shedding the disease germs.

When bacilli have reached and have produced tubercles in the substance of the udder, their escape through the milk is conceded by all. Experiment has even demonstrated that milk has been contaminated time and again where there were no discoverable lesions of the udder. Many men believe, however, that even if such lesions or tubercles are not found by careful search, that they still exist. Tuberculosis of the udder must have existed for a long time and have been dangerous from the outset before it can be discovered or recognized by external touch. I very much doubt whether a single expert in physical diagnosis in the United States can satisfactorily diagnose tuberculosis of the udder or differentiate it from ordinary mammitis or garget in a single case out of ten, or even more.

The means of entrance of tubercle germs into the body are through the natural orifices as nostrils and mouth, conveyed as so much dried dust in the inspired air, or as contamination upon the food. It has occasionally happened that solitary germs have gained entrance through injuries or external wounds. Dr. Coppez's case (*Revue Gen. d'Ophthalm* XV. [1896], 433), in which a girl became infected through an abrasion on the finger, while milking, gives an interesting example of the virulence of the bovine germ when inoculated in this manner. Within six months the girl had thirty-five subcutaneous abscesses situated in different parts of the body. Afterwards more appeared, up to sixty-six. While the subcutaneous abscesses healed within a year, the disease reappeared in the eye, which was destroyed, and sometime after, death of the patient followed from disease of the internal organs.

In earlier studies of the pathology of bovine tuberculosis, it was taken for a proved case, that if tubercles appeared in the thoracic organs alone, that they must have been breathed into the lungs. Examinations of young cattle have long convinced me that this was

neither necessarily nor probably the case, for those which had not been subjected to stable infection to any degree were often affected solely in the thoracic organs. On the other hand, food infection was and is supposed to be indicated by tubercles in the abdominal organs. In an experiment recorded by Dr. Smith (O. C.), the infection made under the skin of an experimented animal spread to an adjacent gland and thence to the lungs, without any intermediate tubercles. The presence of tubercle in the thorax is then only an index that the bacillus arrived in the body presumably through the mouth or nose.

The experimental infection of calves and swine by infected milk from tuberculous cows, whether the udders were discovered to be infected or not, has been tried with positive results in transferring the disease so often, that this phase of discussion is past argument. The milk from some tuberculous cattle is dangerous.

The knowledge that tuberculous cattle are the only practical means of producing the infection of surroundings, fodder and milk, brings along with it a desire to know whether the disease can not be eliminated by separating the dangerous cattle and thus protecting the others.

If all the tuberculous cattle can be picked out, and if the surroundings can be carefully cleansed of all living germs, it is apparent that the proposition will be scientifically answered and practically, also, providing that cattle owners are prepared to meet the loss of a few years in a much shorter time.

The fact that the majority of tubercular cattle, more than nineteen out of twenty, can be selected by physical and special tuberculin examination, is granted by all who have made any study of the subject.

Tuberculin examinations consist in the injection of a substance called tuberculin underneath the skins of cattle subjected to the test. This injection causes no practical disturbance in healthy cattle, yet in infected animals produces a thermal or heat rise of from 2° F. to 5° F., which lasts from ten to eighteen hours after the injection.

The only objection that is now raised against tuberculin is that it does its work too thoroughly, selecting cattle with little tuberculosis as well as those with more.

Physical examinations, beyond enabling the selection of cattle which have long been dangerous and are nearly dead of the disease, are of little account. No examiner of cattle in the United States is so skilled that he can pick out all the dangerous cases in a herd by physical examination, and all the leading experts deny the possibility of its being done. Physical diagnosis alone is comparatively worthless.

Infected stables have been disinfected by ordinary methods, and cattle placed in them have not contracted the disease in a number of years. It has been claimed that some stables can not be disinfected; if such is the case, such should be abandoned or rebuilt. The expense would be in no case more than is advised by the Cattle Commission, who recommend sanitary stables as a preventive measure in the eradication or rather in the partial suppression of the disease. To those who want to exterminate the disease from their herds, the disinfection of stables is but a small matter.

With nineteen out of twenty tubercular cattle removed on the first examination, and the twentieth removed on the second, and with the stables being disinfected, it is practically possible to eradicate tuberculosis from any herd and from all herds. The cleansing of some herds once tubercular has been effected and continued examinations of the newly received cattle and the healthy remainder have demonstrated that it can be done.

The main debate upon the whole question should rest, not upon this and that quibble, as regards the use of tuberculin, but upon the question, is it worth doing? If so, by what method may the greatest economy be gained, and by whom should the eradication be done?

In considering these questions, the class of tuberculous cattle that react to tuberculin is especially meant, it being a conceded matter that tuberculous cattle detected by physical examination should be immediately killed.

A cow that reacts to tuberculin has some of the tubercles in her somewhere, be they few or many and is unsalable for herd purposes, if she is to be mingled with uninfected cows. From 25 per cent to 50 per cent of infected cattle have the disease in lung nodules or abscesses which discharge disease germs. If it is granted that 25 per cent recover which is most optimistic, then it is evident that not 50 per cent, but 75 per cent go from bad to worse, in succeeding years. Is it probable that any cattle owner would knowingly introduce any tuberculous animal into his herd when it is certain that one-third are actively infective, one-third about to be in future years, and, possibly one-third recover? By such introductions in the past, herds have been so diseased that the death rate alone has been from 8 per cent to 16 per cent of the milking animals.

If cows have in them germs of a disease which will sooner or later impair their usefulness and be imparted to other healthy cattle, their value is impaired as sale or exchange cattle. The fact that at a given time a few of them are so slightly infected as to appear insignificantly so, does not in the least improve the condition of the others, nor does it render them as desirable as sound cattle. In point of fact, presence of tuberculosis in an animal destroys its value for exchange purposes. If one of these were knowingly sold without statement as to condition, the seller would be indictable.

If cows capable of spreading tuberculosis, or those which have tuberculosis, are kept with sound cattle, a form of cruelty to animals is practiced, for none should knowingly expose cattle to a contagious or infectious disease. The fact that the keeping of tuberculous cattle in a herd spreads disease is granted by all, some going so far as to say that the disease can not be eradicated; but it must be remembered that these same persons stoutly proclaim against the separation of tuberculous cattle.

In so far as the spread of the disease is considered, every purpose is satisfied by separation of the infected cattle from the sound; for by so doing the disease is confined to those that already have it.

But cattle are kept for the production of beef, milk, butter and cheese, and these are sold to the public. Moreover, the cattle have to be attended to by people who have every right to protection from a disease they may contract.

That tuberculosis in cattle may be and has been transmitted to man is undoubtedly true, and every new observation but adds to the evidence, all going in the same direction. That there are and have been many cases of stable and milk infection in man that have never been recorded is also true.

But that bovine tuberculosis is responsible for any considerable proportion of human tuberculosis is improbable. In 1895, Dr. S. Westray Battle reported at the Salisbury Health Conference that 4,000 North Carolinians died annually of consumption. If the history of these cases were to be had, I doubt not that by far the larger share could be traced back to the disease in other human beings with whom they had been in close association, or to common living rooms. This fact, if it be true, would teach that bovine tuberculosis does not play an all-important role in the annual death rate from consumption in man, and that there is no occasion for great excitement as regards danger from tuberculous cattle.

Still, the fact that people may contract the disease from stables and milk from a small proportion of the diseased cattle, and that some have, demands a recognition of the disease by the public. Every means that may be taken to suppress or prevent tuberculosis is a move in the right direction. While remembering that proper precautions insisted on and carried out among people will reduce the death rate of the decade following the next by 25 per cent, 50 per cent, or even 75 per cent, we may ask or, perhaps, compel the dairyman to sell milk from sound cows. But unless the public are ready to compensate in part for the destruction of values in cattle they should not compel him to destroy them. Only a small proportion of the milk from tuberculous cattle may be proved contaminated with disease germs, and when it is not contaminated, it is wholesome milk, and vendible as such. Destruction of the uses of

that milk should be compensated, undoubtedly, should the contaminated milk from the dairy be condemned, it being criminal to knowingly sell such. Since all authorities point out that sterilization of milk destroys germs, such milk may be rendered harmless. No one should object to using such for cooking purposes, coffee, butter, etc. Practically but part of the milk value is destroyed by sterilization under any circumstances. However, in the neighborhood of cities, the turning of milk from the cart into the churn often destroys the route. If the public compel such action on account of suspicion of danger, or of some real danger, it should meet the milkman half way at least.

Since the beef of tuberculous cattle is innocuous when cooked to a gray color, and of those little tuberculous is passed by authorities as being harmless in any condition, there is a minimum of public danger in this direction. Indeed, it would seem that if the public wished ultimate protection from the milk products, that the little infected animal should pass unnoticed over the butcher's block. The recovery of the beef value hastens the animal's end, and her chances of spreading infection. By this statement I would not counsel against meat inspection, which I believe to be necessary, but against the prejudice in people who condemn meat from cattle condemned by public authorities on other grounds.

In regard to the public consumption of milk and meat from tuberculous animals, it would seem that it were better to patiently swallow the dose for the next few years, providing the cattle owner made effort to separate his cattle, than to continually take the milk from infected herds through succeeding years, with no prospect of effort to exterminate the disease.

The effort to secure wholesome products from infected dairies has been met with various results in the States. Usually the owner of tuberculous cattle has been able to shield them from all comers either by direct methods or by securing the withholding of appropriations for finally exterminating them. The fact that buyers are generally guarding against purchase of tubercular cattle, and that owners of affected herds are studying in every way to recoup against loss, has done more to thoroughly clean herds through the slaughter-house, or, in the case of unscrupulous men, to infect other herds, than all other reasons.

If the amount of damage that may be caused by the sale of tuberculous cattle to uninfected herds, or of their products to people, is sufficient to justify public expenditure, and most sanitarians claim that it is, then clear cut, consistent work should be done by the State.

The most economical method that I can conceive is for the State to examine the herd by tuberculin examination, separate the infected

or suspicious cattle, kill badly diseased cases, if there be any, then depending on the value, as breeders, milkers or beef animals dispose of the remainder; the former to be maintained apart on the farm, the latter to go to the block. Should it be found that this course practically destroys all or a major part of their value at the time of separation, partial indemnity should be given. By cooperation, the disease may the more quickly be discovered and conquered.

North Carolina has, I believe, as little tuberculosis as any State of the Union. New York, with its finely improved herds, has scarcely 2 per cent to 3 per cent tuberculous cattle; Connecticut, Massachusetts and New Hampshire upwards of 10 per cent. If one may judge from the conditions and surroundings, this State should have less than one-half of one per cent. Even this estimate may be high, and but absolutely few herds infected.

Gentlemen, I feel that my talk about bovine tuberculosis is of a disease clinically unknown to you, and one which I hope will remain so, on account of its rarity. If I have set the disease in too strong a light you may know that it is from an experience in over 1,100 post-mortem examinations picked up from many herds under many conditions.

I have seen the crusade against bovine tuberculosis start from small beginnings, until it has spread and carried in all important cattle States. I hope to see the day when bovine tuberculosis in some States is like bovine pleuro-pneumonia coratagiosa, a disease of the past, known to history alone.

THE DIAGNOSIS AND TREATMENT OF DIPHTHERIA.

BY PASSED ASSISTANT SURGEON J. J. KINYOUN, DIRECTOR OF
THE HYGIENIC LABORATORY, U. S. MARINE HOSPITAL SERVICE.
(READ AT WINSTON-SALEM HEALTH CONFERENCE.)

MR. PRESIDENT, LADIES AND GENTLEMEN: The subject upon which I wish to offer a few remarks is by no means a new one, on the contrary, quite an old one. The excuse which I have to offer is that I wish to take advantage of this occasion to say a few words to the parents, particularly the mothers, concerning a malady which so frequently attacks our loved ones, the children—a disease which we so thoroughly dread, diphtheria. We dread it because of the terrors it inspires, the suffering it causes, and the mortality which attends its wake, in infancy and childhood. These are good and sufficient reasons to engage your attention.

Now, the term diphtheria unfortunately does not convey the true idea of the prevalence of this disease in a community. When this disease is announced it is the rule to hear reports of children suffering from diphtheritic sore throat, malignant tonsilitis, putrid sore throat, membranous croup, or other similar euphemistic expressions. These are given it through ignorance or with intent to deceive. In the majority of such cases it will be found on examination to be nothing more, nothing less, than diphtheria.

All these terms engender false security in the minds of the parents in the belief that these do not mean an infectious malady, so the disease spreads and others are sacrificed.

There are hardly any grounds for the support of the contention that membranous croup is a distinct disease. From a sanitary standpoint the disease does not exist. While it is true, on the other hand, that there is such a disease, over 98 per cent of the cases diagnosed as membranous croup are laryngeal diphtheria.

The mortality is the greatest in child life under three years, and gradually diminishes to adult life, when it is only slight. The death rate may be approximately stated thus:

Under two years sixty out of every hundred die.

Under five years and over two years forty out of every hundred die.

Under ten years and over five years twenty out of every hundred die.

Under fifteen years and over ten years ten out of every hundred die.

Under twenty-five years and over fifteen years five out of every hundred die.

Over twenty-five years two in every hundred die.

The majority of the laryngeal cases occur under five years. Of these, eighty-five out of every one hundred succumb.

It has been demonstrated by long and careful clinical observation that children are very susceptible to many diseases, so much so that a number of the maladies are termed child diseases. This is because of the want of resistance of the child's constitution against the invasion of the disease, and further because of the susceptibility of the child's body to conditions of environment. For an example, a sudden change of temperature, indiscretions in diet or in clothing, often will be followed by the child becoming sick.

How often is it noted that a sudden fall of temperature, a change in the weather, is followed by an outbreak of diphtheria in a school or a community, often in an epidemic form.

The lowering of the vital resistance is to increase the susceptibility, and thereby prepares the way for the infection.

Diphtheria is not caused by influences of environment or of habit. It is not a cold, nor an indigestion. It can never occur unless the cause of the disease is present, and only then when the germ multiplies on suitable soil and produces its peculiar poison which causes the disease. It is a germ disease, caused by the *bacillus diphtheriæ*; this germ can exist outside the body, particularly in or on materials which have been contaminated with the discharges of the sick, such as bedding, clothing, utensils, and the like. Its habitat appears to be the mucuous membrane, where it lives, develops, and does its damage. It may, under certain circumstances, exist in the throats of healthy persons, persons who have been in close contact with those sick with the disease, those nursing the cases, or the medical attendant.

The mode of dissemination is usually by direct contact with those ill with diphtheria, or with articles which have been contaminated with their discharges. The concomitants of the school-room are ideal for the dissemination of the disease. The habits of the child, the pencil, slate, books, and toys, the unwholesome atmosphere usual in school rooms, and the drinking cup, are potent factors of disseminating the germ.

Many epidemics have been directly traced to infected milk, milk which has been infected in its handling, usually by those ill with the disease, infecting it when about to be supplied to the consumer. Sewer air has been charged with the causation of diphtheria. It is doubtful if this can be proven. One thing, however, is certain, sewer air can lower the vital forces of the body to such extent that it is not able to throw off the bacillus when brought in contact with it.

All cases of diphtheria are not severe, as one case differs, one from another, in location and malignancy, so may epidemics vary. Many

cases of diphtheritic infection do not have a membrane. Mild cases of diphtheria, not accompanied by a membrane, are from a sanitary point of view, the most dangerous of all. The attack in these cases is often so mild as to attract but little attention, running its course unaccompanied by any of the symptoms or appearances, it may more closely resemble an attack of coryza or quinzy, a simple hoarseness, or it may take the form of "sore eyes." This condition obtains too often. The physician who may be called to see the case may diagnose it other than its true nature. A second case occurs. At this time there can be no doubt of its nature. We are forced to conclude that there is some connection between the first and the second. The first case was one of diphtheria, not showing the membrane.

The recognition of the true nature at this time may be too late to prevent an epidemic. Mild cases will be visited, fatal cases shunned; people keep themselves, also their children, away, thereby in this instance preventing the establishment of other foci of infection.

It would be axiomatic to say that if the first case of diphtheria in a community was promptly detected there could be no epidemic. Herein lies the chief difficulty. It is not always possible to detect this disease by the ordinary methods of observation and examination. In fact, there is a respectable minority of the cases where it would be impossible. These are the atypical cases, those which run the gamut of every symptom, from sore throat to sore eyes. Notwithstanding this, the diagnosis can be made with greater certainty by the microscope than all the other methods combined. When you find the germ present in a disease, the disease is diphtheria, whether you are dealing with colds, sore throat, influenza, tonsillitis, laryngitis, bronchitis, pneumonia, or "sore eyes."

When anyone, be he layman or physician, states that it is always possible to make the diagnosis by inspection, to express it mildly, he is guessing—a dangerous procedure when dealing with diphtheria.

Modern medicine rests upon the foundation of determining the cause of a disease first, the treatment and preventive measures to follow in their regular order. Our aim is to reduce our efforts to an exact science. This we have been in a large measure able to do with many of the infectious diseases since the application of the microscope to the study of these, and particularly to diphtheria.

The microscopical test is now employed in many of the larger cities in our country as well as in Europe. Wherever employed it has been the means of determining positively the nature of the disease, and has enabled those in authority to put in force those measures essential to control its spread. This test has now been in use for over four years, and has passed long ago the experimental stage.

Conclusions adduced from the statistics are facts, not hypotheses. It has been determined that at least 35 per cent of the cases which

were diagnosed as diphtheria were due to other causes. On the other hand, the microscope has been the means of detecting those atypical cases, to which no attention was directed before the employment of this test. It must now be considered as the "sine qua non" in the diagnosis. These atypical or mild cases are not infrequently the causes of epidemics, particularly in schools.

In dealing with the recovery of the patient, two things must be considered: First. There is a clinical recovery, where convalescence has been fully established, yet the germ remains in the throat. Second. When there is full recovery, the germ, however, not having disappeared entirely. The former condition may be only one of days, whereas, in the latter it is usually one of weeks, not infrequently of months. In the majority of cases, however, the germ disappears from the throat or infected spot in about three weeks after the disappearance of the membrane. Those having the germ in the throat are, from a public health standpoint, as dangerous as if there was a membrane present, and should always be considered as diphtheria.

There is no way of determining when the patient has recovered, other than the culture test and microscopical examination. This should always be employed, for without it too great an element of speculation enters the making of the diagnosis, and altogether so in determining when the patient is free of the germ.

It does not require a fully equipped bacteriological laboratory for this purpose, nor an expert bacteriologist to make these examinations. In fact, there is no more excuse for your family physician, at the present day, to be ignorant in this matter than to be unable to recognize an inflammation of the kidneys or know the difference between a blood and pus cell. All these are important and should be known to those who take the responsibility of life in their hands.

The microscope should have an equal, if not a larger place, in the armamentarium of the physician as the thermometer, urinometer, hypodermatic syringe, or pocket case.

Some of our alleged doctors will say they do not believe in such things. So far as theories are concerned, they have a perfect right to confute theory with theory, but have no right to hold to theory and reject facts.

There has never been a time in the history of medicine wherein the responsibility of the physician has been so great as it is now. The knowledge for which we have so long sought and so long desired is now being unfolded. There is a beginning of the new era, the wonderful strides in medical science during the last decade having done more toward placing medicine on its true foundation—exact science—than the progress of the century preceding.

The knowledge which we now possess concerning the cause of diseases, to restore health, to ward off death, entails a responsibility of

power which, if not exercised, makes us fail to discharge the functions of our high calling, and then be justly charged of criminal negligence, if not accused of crime.

The management of diphtheria may be considered to comprise:

(1) Preventive measures; (2) Treatment.

The preventive measures are of two kinds—one applied to an individual case, the other to those who have been brought in contact with the infection.

In the first instance an early diagnosis and prompt isolation is always implied. These measures should always be put in force when the disease is suspected, and to remain so until all doubt is removed. When the character of the disease is determined, the patient should be isolated in a place capable of being well lighted and ventilated, and maintained at an even temperature. The sick room should be provided with only those articles which are necessary for the care and comfort of the patient and nurses. This will limit the danger of infection as well as render the process of final disinfection easier. The patient should be kept isolated until the danger of conveying the disease to others is passed; that is to say, until the germ has disappeared from the throat.

These are the measures which should be taken in every instance, but on many occasions it will be found to be impossible, by circumstances over which the patient's parents or the doctor has no control. How often do we see cases of diphtheria the concomitant of poverty and squalor. Our first duty is to the patient, to assist nature in every possible way in throwing off the effects of the disease; to do the best we can under the circumstances.

Isolation of the case being impossible, those who are associated with it should claim our attention. Children who have been exposed to the disease should be either removed from the patient or be kept under observation until the danger of contracting the disease is passed. This requires from three to five days. It is a good rule to follow, to make a culture test from the throats of those exposed, immediately on the diagnosis of the suspected case, for it has been demonstrated that those having been exposed, and the bacilli in their throats, are very apt to come down with the disease within a few days—further, the object of their removal would be defeated if this precaution was not taken, and would invariably lead to the establishment of other foci of the disease.

The culture test is imperatively necessary if it is contemplated to send children away from their homes to their friends or relatives, and to remain until the danger at home is passed. It may not be practicable to remove other children from the patient; in this case they must be treated, so far as the public is concerned, in the same cate-

gory as if actually infected, and kept in isolation until the patient has recovered, and the apartments or the house is disinfected.

TREATMENT.

The treatment for diphtheria is the anti-diphtheritic serum, or the Diphtheria-Antitoxin. It is both a remedy and a preventive. It is a specific for the disease. Its action is to neutralize the poison of the diphtheria germ and render the tissues of the body insusceptible to the poison.

Before giving the details of its administration I deem it necessary, for a proper understanding of the power and limitations of this remedy, to briefly note the principal phenomena of the disease. Diphtheria is caused primarily by the bacillus diphtheriæ growing in the tissues of the body and secreting a poison, this poison causing all the symptoms which go to make up the disease. This poison is extremely soluble and is rapidly absorbed. Its first effect is local, seen at the point of infection, where it usually produces the so-called false membrane. The poison, having been absorbed, is carried to all parts of the body. Certain tissues absorb the poison more rapidly than others. Particularly is this so with the kidney, liver, heart, and nervous system. The germ itself is local, remaining at the point of infection. It is only found in the blood or lymph rarely and then by accident.

The custom of administering germicides for the purpose of killing the germ in the blood is fallacious, and worse than useless. It is only adding another poison to the one already existent, and thereby further endangering the life of the patient.

With regard to the poison of the diphtheria bacillus, it is the most powerful poison known. Compared with the poison of the cobra, or the rattlesnake, it is four times as deadly. The action of the diphtheria poison is very similar to the serpent venom, the rapidity of its fatal effect being in proportion to the quantity absorbed.

In some cases where the vitality of the tissue is weak, or where the local conditions are favorable for a rapid growth of the germ, a sufficient quantity of the poison may be evolved within a few hours, to cause a fatal termination. Fortunately, this condition obtains but rarely; it usually requires at least twenty-four hours to bring this about.

Its peculiar feature is the affinity which the poison has for certain tissues of the body. It readily attacks the nerves, and we have the local paralysis, which are a frequent accompaniment. When once the poison gains entrance to the nerve sheath its action is much after the order of a ferment; gradually extending upwards, causing a cell death, and a degeneration of the vital part of the nerve. If the

absorption is slight, a local paralysis, temporarily, is the result; if in larger quantity, permanent injury or fatal result follows. Further, the action of the poison on the nervous system may be sudden, or it may be delayed even weeks, and manifest itself when convalescence appears to have been fully established. The explanation of this is that when the poison attacks a nerve cell, it forms a fixed combination with it, which can not be removed. The Antitoxin has no power to restore such a cell when once invaded, however slight this may be.

The degenerations observed in the several organs already referred to, are the results of cell death. If the number of cells involved is sufficient to cause the function of an organ to cease, death must inevitably follow.

On examining a number of fatal cases of diphtheria, we will find that about one per cent die at the end of the second day; 25 per cent die at the end of the fifth day; 50 per cent die at the end of the eighth day; 24 per cent die at the end of the fifteenth day and after.

The explanation of this may be given by analogy. If a number of susceptible animals be given each a quantity of the diphtheria poison, which will prove fatal in from eight to ten days, and one of these be killed and examined on each succeeding day, the following changes will be observed: There is a progressive degeneration or cell death in the liver, kidney, spleen, heart, and nervous system until the third or fourth day, when the process becomes stationary. At this time the damage is done; the functions of organs necessary to life have been so damaged that death must inevitably ensue, because the disease has progressed beyond the point when repair and restoration are possible.

This experiment goes far in explaining why Antitoxin must be given early in the disease. If the administration is delayed beyond the point when the degeneration has involved the function of an organ, it will do no good. The poison must be neutralized before this stage for it has no power in removing the poison after it has united with the cell. Nor will it restore to life a single cell.

We now have the record of four years' experience with the treatment of diphtheria with Antitoxin. It has long passed the stage when it was viewed as an experiment. It has proven beyond the shadow of a doubt that its specific action in diphtheria is as great as morphine is for pain.

The role it plays in the cure of the disease is the same in all respects as Nature performs when recovery takes place. No case of diphtheria ever recovered until there had been evolved in the tissues and the fluids of the body this same Antitoxin, in a quantity sufficient to neutralize the poison and protect the cells from its further invasion.

The preformed Antitoxin which we administer does exactly what Nature would do were she able—neutralizing the poison in a short time—(a process of hours), what it would require Nature several days to do. This being true, is it not more rational to administer this preformed Antitoxin than to temporize, hoping that sufficient quantity will be formed in the body in due time to bring about a recovery? Would you trust to luck in a case of opium poisoning, rather than to resort to the stomach pump and other remedial agents, which you know will do good?

Antitoxin will not dislodge the poison of diphtheria when once it enters into combination with the cell, particularly those of the nervous system. Its action is twofold: (1) In neutralizing the poison when it is free in the blood and lymph; that is to say, before it invades the cell; (2) To protect the cells from invasion. This is all we hope to do. A good and sufficient reason why the Antitoxin should be administered at the earliest possible moment in a quantity to produce its physiological effect.

The quantity to be given to the patient varies in accordance with age and body weight, the character and gravity of the disease. To a child under one year (from fifteen to twenty-five pounds), 1000-1500 units is an ordinary dose; over one year and under five (twenty-five to fifty pounds), from 1500 to 2500 units, the dose to be repeated within eight hours if no improvement is noted. If the case is one of laryngeal diphtheria, even larger doses should be given. It is always better to give one large dose early in the disease, rather than small doses at short intervals. If the Antitoxin is administered on the first day, the death rate is practically nil; if on the second day, 2 per cent die; on the third day, 6 per cent die; if on the fifth day, 15 per cent die; and, after the fifth day, there can be little expected.

It may be summed up thus: Give Antitoxin early, give a plenty; it can do no harm.

This last remark suggests another subject: The alleged ill effects of the Antitoxin. It has been claimed by some that this substance has a deleterious effect on the heart and kidneys, that since its use cases of paralysis have increased. As to the statement made with regard to the cardiac and nephritic complications, careful observers have not seen an increase either in number or intensity; but on the other hand, the Antitoxin has had the effect of diminishing these. In fact it is usual to note its good effects in albuminuria. With regard to the increase in the number of cases of paralysis, it must be admitted the number is much larger than under our former methods of treatment. The explanation of this may be stated thus: *Under former methods of treatment, paralysis was observed*, and was a death rate of from 35 to 50 per cent; that is to say: Before the Antitoxin treatment, in every 100 cases 45 died, 55 recovered, 15

of these had paralysis. 5 more had cardiac and renal complications. Under the Antitoxin treatment: In 100 cases, 15 die, 85 recover; 25 of these have paralysis. 10 have cardiac and renal complications.

Is this increase due to the ill effects of the Antitoxin or to its effect of transferring 30 cases from the dead to the living column? Formerly, had the cases lived sufficiently long for the paralysis to supervene it would have been noted; under the Antitoxin treatment these live and ill effects of the disease are noted. Even admitting, if it were true, would not a living child with diphtheritic paralysis or a cardiac complication be preferred to one dead of diphtheria without the complication? I ask the mothers their choice?

Now as to the accidents attendant upon its administration. Only two so far have been recorded out of over a million doses administered. It is far safer than chloroform or ether, yet we know that fatalities are not infrequent in their administration. Notwithstanding this, is it justifiable to discontinue them on account of these accidents?

The results of the treatment can best be judged from the statistics. In 1896 it became my duty to collect the statistics of the Antitoxin treatment as applied to cases in the United States. For the year 1895 and the first three months of 1896 there were collected 7,021 cases of diphtheria and croup treated with Antitoxin, with 741 deaths, a death rate of 10.6 per cent. In comparison with these there were recorded 2,936 cases of diphtheria and croup occurring synchronously and in the same places with 1,110 deaths, a death rate of 39 per cent.

These cases were taken indiscriminately just as they were reported and comprise all forms of the disease, save those having no other symptom than the bacilli in their throats. These were classed with the immunized cases.

At this time I was able to collect over ten thousand cases of those who had been exposed to the disease or having the germ present in the throat. All these were given an immunizing dose, with the result of thirty mild cases, with no untoward results. As an immunizing agent—for a short period—its effects are almost absolute. It is interesting to record the results of the Antitoxin treatment in the largest cities in the world.

In Berlin the death rate for the years 1890 to 1893 (four years) was 35.34 per cent, and for 1894 to 1897, four years (the Antitoxin years), the death rate fell to 18.08 per cent.

In Paris the results were much the same. as the statistics will show:

In 1890 there were 1,639 deaths from diphtheria and croup.

In 1891 there were 1,262 deaths from diphtheria and croup.

In 1894 there were 993 deaths from diphtheria and croup. Antitoxin was just commenced, and then in one hospital.

In 1895 there were 411 deaths.

In 1896 there were 441 deaths.

In 1897 there were 274 deaths.

In our own cities, for example, the death rate is nearly two and a half times less than before the Antitoxin treatment. New York had 2,900 deaths recorded in 1894, before the Antitoxin treatment was begun, as contrasted with 900 deaths for the year 1898.

The same story might be recited for other places where Antitoxin is used.

Sufficient has now been said about its efficacy, and the necessity for its administration. I can not refrain from adding a few words regarding the management and treatment of the cases as we find them. Where it is possible to isolate the patient, it should always be done. After the administration of Antitoxin good nursing, assimilable food, hygienic surroundings, are always in order. Every aid should be given Nature in her fight against the disease.

Isolation may be impossible; then those who have been exposed to the infection should be given an immunizing dose, and treated as if infected. This will not result in harm either from the injection or from contact with the disease. They are vaccinated against diphtheria for at least thirty days. A word of caution to those who are in the habit of paying neighborly visits of sympathy, condolence, or help. While these may be necessary (and when so never to be objected to) such aid should be rendered under precautions that will prevent infection being carried by these persons.

A parent who visits a case of diphtheria on the plea that he is not afraid of the disease and takes no further precautions than are dictated by the absence of fear, is a fool. This is a too frequent way in which the disease is spread. The only redeeming grace for such persons is an unbounded faith in the efficacy and early administration of Antitoxin.

BATHS.

A PLEA FOR THEIR GENERAL USE IN THE HOUSEHOLD.

READ AT THE WINSTON HEALTH CONFERENCE BY S. WESTRAY
BATTLE, M. D., OF ASHEVILLE.

LADIES AND GENTLEMEN: For the past several years these instructive meetings, which our Secretary has been pleased to call "*Health Conferences*," have grown in popular favor and prospered, and where, to most appreciative and attentive audiences, we have talked over those subjects which are germane to the public health, (and which, alas, too often are overlooked or ignored), with a view to the better understanding of the things which tend to contribute to our well-being, which prevent disease, aye, and rout and cure it, too, and which tend to prolong this our life and make it more vigorous and enjoyable. In short, we have endeavored always to bring up for discussion those *homely* matters which, for the most part, we pass over lightly in our daily life in pursuit of the more absorbing affairs of the moment, but which are really of the greatest importance.

At one time we have had under discussion "*The Air We Breathe*," at another "*The Bread We Eat*," and again we have talked about "*The Water We Drink*," and so on; and in this connection it has occurred to me that *the water we use outside is equally important as that which we take inside*, and to reiterate, water "*properly* applied inside and outside of man, has more regenerating grace in it than most people are aware of. Cleanliness is not only *next* to godliness, but it is a stepping-stone to help a person *up into godliness*."

Doctor Simon Baruch, to whom New York is indebted for the introduction of public rain-baths, neatly puts it: "While anatomy and physiology have abundantly demonstrated the value of cleanliness for the preservation of *physical* health, we find ample warrant for affirming that it is equally valuable for the maintenance and improvement of a *spiritual* form, in the fact that religious observances of all sects command *washing and bathing* in some form of their ceremonies. The Egyptian priests were wont to wash their bodies three times a day whenever they prepared for great sacrifices.

"The Jewish ordinances abound in the commandment of *baths and purification*. Baptism by immersion is *another* evidence of the estimation in which the *bath* was held as a moral purifier.

"The Greek priests washed themselves twice every day and night in order to prepare for their sacred duties.

"The pious Turk regards it as *imperative* to wash his face, hands, arms and neck before he invokes Allah.

"The Brahmin makes his ablutions *three* times daily, and the rich and poor alike, in that country of caste, journey to the shores of the Jumna and of the Ganges to purify themselves in their sacred waters.

"*The civilizing influence of soap and water has long been recognized.* The cartoonist, in representing the anarchist as a dirty, long-haired individual, furnishes a recent expression of *this idea*.

"Political economists, too, have not failed to recognize the influence of the absence of facilities for proper hygiene in the promotion of misery, disease and death. That eminent logician, Mr. Alexander Bain, has epitomized the experience of the world on this point in his essay on *Constituents of Happiness*. 'That prime requisite, HEALTH,' says he, 'is very imperfectly secured, in the lower grades, even of respectable citizenship. The public registers have demonstrated that mortality and disease diminish with every rise in the scale of wealth.' And cleanliness is certainly the first step.

"And yet, with all these stubborn *facts* before us, *we*, who *boast* of our civilization, are far behind other nations, *ancient as well as modern*, whom we are wont to regard as *less* civilized than ourselves."

So I shall bring up for discussion this evening the subject of "BATHS," their *usefulness* and *healthfulness*, and the *comfort* of the *daily* ablution. And in doing so, it may be interesting, not to say fascinating, to sketch, in passing, some of the *different kinds of baths* that have been in use since their inauguration down to the *present* time.

Water in its *practical application* is a benign agent "whose *beneficence* no charge exhausts," and the *possibilities* of whose manifold resources is a *vista-way* which leads to a broad field now ready for cultivation and the sowing of the *seeds of health*; and the possession and enjoyment of whose refreshing, healing powers is a luxury which lies within the easy reach of *all*. And yet, I am *sorry* to say, it is true that *water does not* receive the attention it merits in the matter of its *outward* application, either from the hands of the profession or the laymen. We have wasted our days since time immemorial, and spent our energy and fortunes in chasing this ignis fatuus or that over the four corners of the earth in our search after some *universal* remedy—some *cure*—for all the ills that flesh is heir to, when it is to be found *at our very doors*—CLEAR, SPARKLING WATER.

" 'Till taught by *pain*,

Men really know not what water's worth,"

nor yet do they duly appreciate the *luxury of the daily bath*. It is a well-known fact, however, that "those persons who bathe *often* and are cleanly in all their habits, are generally *healthy, moral and virtuous*. Thieves, liars, pickpockets, drunkards and gluttons seldom bathe. That man is not a very good Christian who never bathes, and he who takes a daily bath is not generally a very great sinner."

To every conceivable use to-day does man's ingenuity apply water,—

except, perhaps, a more intimate acquaintance with himself; in remote villages it turns still the wheels of ye olden mills; through the confines of the forest swiftly does it carry the logs to the lathe; in many a thrifty manufacturing district are the looms made to run by its power alone; and harnessed down in iron bands it now furnishes, *greatest achievement of all*, the vast energy necessary to generate the electricity that lights some of our larger cities; and its *too* free introduction into the milk-can has caused many a favorite housewife to exclaim, "*The milkman's favorite song should be, 'SHALL WE GATHER AT THE RIVER!'*"

Just how closely water is related to the things of the material world has been summed up briefly in these simple lines of Miller, who tells us that there is "not a wild beast roams the forest, or worm or insect crawls upon the ground, or domestic animal plucks the grass of the field, not a bird that flies, or a fish that swims, whose bodily structure is not more than *two-thirds water*."

"It is, too, the most abundant element in the structure of man, about seventy-five per cent of the human body being water. Thus a man weighing 154 pounds, comprises 116 pounds of water and only 38 pounds of dry matter. Eighty per cent of the blood and seventy-four per cent of the flesh is water, and this element also forms about one-eighth of the dry bones.

"Life could be longer sustained without *food* than without *water*. The daily average quantity of *food* required for a full grown man is *two and a half pounds*, while in the same time he takes *three and a half pounds of water*. A large proportion of the *solid* foods are composed of water.

"Water is the natural drink of all animals, and is the medium employed for dissolving and digesting the food and distributing it to the different parts of the body. No function of the various organs of any animal could be performed without it. It gives the *brain* its *power to think and feel*, to the *heart* its *power to circulate the blood*, to the *muscles* their *power to contract*, to *cartilage* its *elasticity*, to *tendons* their *pliability and toughness*, and to the *bones* their *strength and power of resistance*.

"Who does not know, too, how the *summer shower* purifies the air of its noxious *vapors*, rendering it so sweet and refreshing to *breathe*, *baptizing* the trees and plants, and giving *new life and animation* to everything it touches. Even the *cattle* on a thousand hills are made happier and fresher by the falling rain.

"The human body is constantly undergoing *changes*. It is important that the *worn out* material and *waste* matter should be removed from the body as *fast as it accumulates*, and *water* is the medium for that—*nothing* can take its place.

"The skin contains about 7,000,000 of little *canals or sewers* called *pores*, and through these *three-fourths* of the effete matter of the body

is excreted, the mouths or discharge-pipes of these pores open upon the surface, and deposit their contents upon the *skin*. If this waste matter is *not* removed it *accumulates*, *dries* and soon *chokes up* these openings, thus preventing the proper discharge of their contents, or perhaps entirely *closing* them.

"A *daily* bath is the most *effectual* means of removing these deposits for persons in ordinary health, but when the pores have for a long time been *closed* and effete matter has *accumulated* in the system, so as to cause *disease*, TWO or THREE baths a *day* may be necessary to remove it *successfully*."

In regard to general rules for *bathing*—

"A bath should NOT be taken within one hour *before* nor two hours *after* eating.

"*Head and face* should be bathed at *commencement* of any bath, thus *preventing* a *rush of blood* to the *head*.

"A bath NEVER should be taken when body is exhausted.

"Should be taken *briskly*, and bather should rub *himself*.

"Dry body with linen or cotton sheet, rather than towels."

The reasons given by an eminent physician for *not* bathing soon after or before eating is "that in bathing the blood is brought to the *surface* in large quantities and circulates freely in the capillaries of the skin, being drawn away from *internal* organs and generally diffused through the whole body, and the more freely this external circulation and warmth is kept up, the more refreshing and invigorating the bath becomes, and the greater the benefit derived from it; whereas, when the stomach has *recently been supplied with food* the blood is *diverted* from the external circulation to the digestive organs to supply the secretions and juices necessary to carry on the digestive process.

"From *these* facts it will be evident that if *food* be taken into the stomach too soon *after* a *bath* the blood is directed to the *stomach* before a *full reaction* has taken place, thus *interfering* with its beneficial effects; while, on the *other hand*, if the *bath* be taken too soon after a *meal*, the blood is diverted from the *digestive organs* before digestion is *completed*, and thus a *very* important function of the body is *interfered* with.

"In cases of *active congestion* or *inflammation*, in *fevers* or in *severe pain* and *distress*, it may be necessary to make water applications, *irrespective* of this rule.

"The beneficial effects to be derived from *bathing* depend *very much* upon the *temperature of the bath*, and the *manner in which it is given*; and those physicians who exercise the most discretion in adapting it to the *various temperatures and conditions* of their patients will be the *most* successful in their practice.

"A bath of *given temperature*, entirely appropriate to a patient of a temperature affected with a certain disease, might be of little use or

even absolutely injurious to a patient of a *different temperature*, though suffering from a *similar disease*.

"Some of the *early* German practitioners have brought the Hydro-pathic practice into lasting disrepute by the *indiscriminate* use of the *cold bath*; and on *this* account we find very many persons who have such a horror of '*Cold Water Cure*' that they will hardly tolerate the use of water at *any* temperature, *even for the purpose of cleanliness*.

"The *nervous* susceptibilities of people differ so widely that a bath which would seem *tepid to one* would feel *cold to another*, while it might appear *warm to a third*; again, the sensations of the same person *vary* so much in different conditions produced by *disease*, by *exercise*, by the *temperature* of the surrounding *atmosphere*, etc., that a *tepid bath* might feel *warm at one time* and *cold at another*.

"We call a bath *COLD* when the water is of the temperature found in *wells, springs, cisterns, rivers and lakes*; water baths can *rarely* be borne above *110 degrees*, yet *some* can bear *115 degrees* as readily as *others* can *100 degrees*.

"The *vapor* or *Russian bath* can be borne as high as *120 degrees*, but is usually given from *105 to 115 degrees*.

"The *Turkish* or *hot-air bath* is enjoyed by many at a temperature varying from *150 to 240 degrees*, and is less liable to produce unpleasant sensations at *180 degrees* than the *Russian or vapor bath* at *110 degrees*."

What we call

Cold baths run from 32 to 65 degrees.

Cool baths run from 65 to 80 degrees.

Tepid baths run from 80 to 92 degrees.

Warm baths run from 92 to 98 degrees.

Hot baths run from 98 to 115 degrees.

So many different kinds of baths are there that their name is *legion*. For instance we have the "*Sponge or Towel*" bath, "*Dripping Wet Sheet*," "*Shallow Bath*," "*Half Bath*," "*Full Bath*," "*Shower Bath*," "*Spray Bath*," "*Douche Bath*," "*Hose Douche*," "*Pail Douche*," "*Cata-ract Douche*," "*Local Douche*," "*Plunge Bath*," "*Hip or Sitz Bath*," "*Wet Sheet Pack*," "*Dry Pack*," "*Half Pack*," "*Chest or Stomach Pack*," "*Fomentations*," which latter consist in placing the patient on a *folded dry blanket*, then saturating a woolen cloth with *boiling water*, and as soon as *cool enough to be borne* place on part to be fomented and cover over with ends of dry blanket. *Remove and renew every 6 to 12 minutes*. Recommended for *pneumonia, inflammation of the lungs, pleurisy, gall-stone, stone in bladder, congestion and irritation of liver, stomach, bowels and spleen*. *Indian meal* and *flax poultices* are also *excellent* in like affections.

Nor should we omit the *salt bath*. The advantages of *sea bathing* are that *sea-water* is *very stimulating*, induces *free circulation* at the

surface, and thus secures a *speedy reaction*. Then, too, the *particles of salt adhering to the skin*, aided by the *friction of the clothing*, keep up a *constant irritation or stimulation of the surface*, and *lessen the liability to take cold after a bath*. There is generally *active exercise* and a good degree of *mental excitement and exhilaration* when a *dozen or more* go hand in hand into the sea, with the breakers dashing over and around them, and *under such circumstances the necessary reaction is readily secured*.

A writer on the "*Antiquities of Gaul*" says "the *Greeks and Romans* who observed the *custom of swimming, bathing, rubbing and anointing*, used it in the first instance, in early times, as a *part of their course of gymnastics*. It was also under their habits of living, and in the climates under which they lived, *if not necessary, yet conducive to a healthy state of the body*. Their not wearing or using in their bedding any *linen*, would render the *skin continually liable to contract impurities and scorbutic excrescences*, the *scales of the skin* would be loaded, and the *interstices of them obstructed*.

"Every means, therefore, which could *force perspiration and sweat*, either by *strong exercise* or by *culinary heat*, became a *matter of remedy* to *force the obstructions*, and to *dissolve or loosen the accretions*. When these were *thus loosened, washing and friction* were the *next processes to scrape off and deterge* them. This *friction and scraping* was performed in the baths, that is, in *baths of different heat*, as the *case or the humor* of the bather required, by an instrument called a *strigil*, a *scraper* formed in a *curve* so as to round the contours of the limbs and muscles. This is an article of antiquity *perfectly understood*. The *frequent use* of this became, in some cases, *hurtful to the skin*.

"Then there was another instrument used for this purpose, not so commonly and precisely known as the former. I mean the *pumex*, which acted as a kind of *flesh-brush or rasp*. . . . An instrument of the same shape, but made of *pottery, hard-baked*, and cut on the face with *little squares*, like a *file or rasp*, was sometimes used, instead of the *pumex*, for this *pumex* was not always attainable in every situation.

"But the use of the *pumex* stopped not here; it was so prepared as to *polish the skin*. Martial wrote of the *polished delicate hand* of a PETIT MAITRE of his time as '*Manum Pumicatum.*' Juvenal also mentions the use of the *pumex* "*Si tenerem attritus Catinensi Pumice lumbrum,*" and Pliny remarks that *this polishing of the skin with the pumice stone* was *originally a process of luxurious delicacy* used only by the ladies, but is *now* used by the men.

"After this operation of *friction, scraping, polishing*, the *next* was the *deterging and drying*. This was performed with the *sponge* sometimes, at others with *linen rubbers*, and, in *after times* of effeminate luxury, with *towels of the softest wool*, and, perhaps, also *cotton*.

"The last operation of the baths and thermæ was the *anointing*. This, in times of refined luxury, was done with oils and ointments of the most delicate perfumery. These perfumes were served in VASA UNGUENTARIA, and whatever was the material, whether they were made of glass, gems or fine pottery, they were named ALABASTRA. Many of these have been found and are preserved.

The most ancient records, however, of baths and bathing, have come to us from those countries tributary to the Nile and Ganges. These are in the year B. C. 1356. Meager enough they are to be sure, but *Fancy* takes up her brush when *fact* lays down the pen, and fills in the pictures for us."

Now they pass before us in panorama:

In the year B. C. 1356, we read of the pagan priests commanding a multitude to arise and go down into the sea and bathe and purify itself that it might participate on the following day in the festivities, and pay honor to *Demeter in the Mysteries of Eleusis*.

Then *Homer* sings of the warm baths so soothing to the athlete and indulged in by the Grecian nobles; though not so luxurious as the baths of some other nations of that time, the Greeks, we are told, used this warm bath to excess.

The Romans built their baths on a plan in keeping with their proud city—Rome. *Glaucus*, in *The Last Days of Pompeii*, thus bursts forth in eulogium of the luxury of the Roman Baths. "Imagine all Pompeii converted into baths, and you will then form some notion of the size of the imperial thermæ of Rome. But a notion of the SIZE only! Imagine every entertainment of mind and body—enumerate all the gymnastic games our fathers ever invented—repeat all the books Italy and Greece ever produced; suppose places for all these games, admirers for all these works; add to this baths of the vastest size, the most complicated constructions; interperse the whole with gardens, with theaters, with porticoes, with schools—suppose, in a word a city of the gods, composed but of palaces and public edifices, and you may form some faint idea of the glories of the great baths of Rome!" To-day the altar of Saint Peter stands over the ruins of the Thermæ of Titus, the destroyer of Jerusalem.

From the Romans have been handed down to us those luxuries of the bath—of perfumes and oils and pomades used in that after-luxury of the bath—massage.

The early successors of the Roman baths are the Russian, or hot vapour bath, and the Turkish, or hot-air bath.

In the Russian bath vapours are applied to the body until excessive perspiration sets in, when, after a lather of soap, which is rubbed off, a jet of cold water is applied, or, even more severe, the Russians go out and roll themselves in the snow.

The *Turkish*, or *hot-air* baths, can be *better* borne by many in that there is no *moisture* to fill the bronchial tubes and lungs. The *perspiration* is even *more* profuse than in the Russian bath, and it enjoys a *wider range of application*.

Away up in far NORTHERN EUROPE, which I had the pleasure of visiting last summer, it is *interesting* to know that THERE we found some of the *finest bath establishments in the world*. This *especially* applies to *Sweden*. *Bayard Taylor* the great traveler, describes most interestingly the *vapour-bath*, which is the universal thing is far-away *Finland*. I quote a page from his book on *Northern Travel* done in 1856. "Mr. Wolley proposed to us *another* luxury, in the shape of a *vapour-bath*, as Herr Frostrom had one of those bathing-houses which are universal in Finland. It was a little wooden building without windows. A Finish servant-girl, who had been for some time engaged in getting it in readiness, opened the door for us. The *interior* was *very hot and moist*, like an Oriental bathing-hall. In the *center* was a pile of *hot stones*, covered with *birch boughs*, the *leaves* of which gave out an agreeable smell, and a large tub of water. The floor was *strewn with straw*, and under the roof was a platform *extending across one end of the building*. This was covered with *soft hay*, and reached by means of a ladder, for the purpose of getting the full effect of the steam. Some *stools*, and a *bench for our clothes*, completed the arrangements. There was *also* in one corner a *pitcher of water*, standing in a little heap of snow to keep it COOL.

"The servant girl came in after us, and Mr. W. quietly proceeded to undress, informing us that the girl was bathing-master, and would do the usual scrubbing and shampooing. *This*, it seems is the general practice in Finland, and is but another example of the unembarrassed habits of the people in this part of the world. The poorer families go into their bathing-rooms together—father, mother and children—and take turns in polishing each other's backs. It would have been ridiculous to have shown any hesitation under the circumstances—in fact, an indignity to the honest, simple-hearted, virtuous girl—and so we deliberately undressed also. When at last we stood, like our first parents in Paradise, 'naked and not ashamed,' she handed us bunches of birch-twigs with the leaves on, the leaf of which was suggested by the leaf of sculpture. We mounted to the platform and lay down on our backs, whereupon she increased the temperature by throwing water upon the hot stones, until the heat was rather oppressive, and we began to sweat profusely. She then took up a bunch of birch-twigs, which had been dipped in hot water, and switched us smartly from head to foot. When we had become thoroughly parboiled and lax, we descended to the floor, seated ourselves upon the stools, and were scrubbed with soap as

thoroughly as propriety permitted. The girl was an admirable bather, the result of long practice in the business. She finished by pouring hot water over us, and then drying us with warm towels. The Finns frequently go out and roll in the snow during the progress of the bath. I ventured so far as to go out and stand a few seconds in the open air. The mercury was at zero, and the effect of the cold on my heated skin was delightfully refreshing."

Then *high in popular favor*, wherever they have been introduced, are the *Electric Light* or *Radiant Heat Baths*. If you remember, a few years ago, a wave swept over a greater part of the Northeast, and report was rife that a cure had been found for consumption, etc., and forthwith the gullible people went to work to put blue glass into their sunniest windows that they might bathe in the light of a new sun. From *this beginning in FALLACY* there has evolved what I believe to-day is a *system* of great value in the treatment of disease—the new *Electric Light* or *Radiant Heat Baths*.

"Experiments in *Europe* and in *this* country have shown that the *electric light* may be utilized so as to exert the same powerful influence upon *plant* growth and all kinds of *animal* life AS SUNLIGHT."

And following out *these* lines there has been invented *glass-covered couches*, upon which reclines the bather, while from *below* him, *above* him, on *every* side of him, pour upon the *surface of the body* reflected and multiplied by polished mirrors, countless numbers of electric light rays which not only *fall* upon the *surface* of the *skin*, but *penetrate* to the *remotest recesses* of the *body*, and therein lies its great merit,—*reaching* and *penetrating* the body it comes in *contact* with disease, and I believe has a wide range of application. It is a capital substitute for the Turkish bath.

The *Silesian* peasant, *Priessnitz*, who introduced *hydrotherapy* into *England*, bestowed upon humanity a *boon*, to the *worth* of which he gave not a *thought*. *How much* that boon has been to humanity it will not be hard to *estimate* when we look at the *impetus* it has received in *recent* years and the *wonderful results* of its *practical application*.

In *Bath* and *Baden-Baden*, of course, we have *all* read of the *fads* which possess the *habitudes* of these popular resorts from time to time.

Under the stimulus of *Lassar's* labors in *Germany*, a wonderful system of public baths have been inaugurated, and where for a few *thalers*, a most refreshing bath may be had.

And in *this* country, *Doctor Simon Baruch* has gotten the people throughout the *North* interested in his philanthropic work, and has inaugurated a system of *public rain-baths* in the *city* of *New York*, which stands a *monument* to his *faithful work* and *untiring energy*.

I had the pleasure of visiting *Doctor Baruch's* baths while on a

recent professional trip through the North, and upon seeing them I was tempted to *exclaim* that the *half* had not been told! I had read a good deal about Doctor Baruch's work, but I had no *conception*, until I *personally* inspected his establishments, of the *immense* undertaking it must have been—of the *untiring energy* and *indomitable will* displayed, of the *obstacles* overcome, and lastly, the *crowning success and establishment* in *New York* of this *great philanthropic enterprise*, which offers to the *wage-earners* a ready method of keeping their bodies *clean*.

And I hope the day is not *far distant* when public baths such as outlined by *Doctor Baruch* will occupy a place in some of the public buildings in *every city of ten thousand inhabitants* in *NORTH CAROLINA*. Such a plant may be done where the water supply is *adequate* at a cost of *less than \$5,000.00*, and should be *self-supporting* at a cost of *10 cents a bath*, which would *readily* place it in reach of every *wage-earner in America*. And, *further*, redound *enormously* to the *wealth* of the place by the *increased health of the community*.

The *complete bath-tub* with *hot and cold water* is of course a *luxury*,—a *luxury* that *many* can by no means afford, but its *absence* does not need to carry with it the *idea* that the *bath* may be *dispensed with*, nor does the *absence of the complete outfit* for bathing detract from the *necessity of the daily ablution*. So I make a plea *to-day* for even the *simple basin or tub* and *soap and water* and a *rough towel*!

The most *athletic* people on the earth are the *BATHERS*! and the most *progressive nations* are the *BATHING NATIONS*! And just *here* I am reminded of the great difference between the *Chinese* and *Japanese* nations, who represent, we might say, two *extremes*. *Japan* is the *Great Britain* of the East; indeed, it may be called the most *wonderful* nation on the earth *to-day*, *bathing* their chiefest delight and greatest medicine; and *hot baths* several times a day being the *custom*, even in *hot weather*. And during the recent war when this handful of *progressive, body-washing Orientals* thrashed the *pig tail Celestials* out of their *sandals* they still had time to keep up the *bath*, and wherever it was *possible* the *public baths* were *daily visited* by *regiment after regiment* in order, and the *daily bath* was a *part and parcel* of the *regular military routine*, an order that was *never omitted* where *water was accessible*. In speaking of the *difference* between these two nations a friend of mine used to say that the *Japs* washed their *bodies* rather than their *clothes*, while the *Chinamen* washed their *clothes* and *never* their *bodies*.

The *bath* habit is not the *only* distinctive *habit* between nationalities, as you are aware, and I recall rather an amusing story in illustration: Given a *cafe* and a *mug of beer* into which a *fly* has fallen

—a *Frenchman*, on discovering the pesky little creature will call the garçon and, flinging French oaths at him, *leave the place*; the *Anglo-Saxon* will say things *equally* disagreeable—and call for *fresh* beer; the *German* will carelessly fish out the fly, *drink* his beer, and call for ANOTHER mug; the *Russian* will drink his beer, fly and all—and call for more beer; while the CHINAMAN will CAREFULLY FISH OUT THE FLY AND SWALLOW IT,—and leave the beer for the waiter!

So again, let me make a plea for water,—*plenty* of old fashioned soap and water, and few there are who may not rub and scrub the body in its *entirety* at least several times a week with great *comfort* and *unspeakable benefit*.

And, ladies and gentlemen, in *closing*, I exclaim with the *Sage*, “Now rub and scrub your noble palaces clean,” and “Blessed be he who invented BATHS, whether he were Hercules or Bacchus, he deserved *deification!*”

And pray remember, ladies and gentlemen, that while there's life there's soap.

SMALL-POX IN IREDELL COUNTY—A HISTORY OF THE
EPIDEMIC—WHERE IT CAME FROM—METHODS EM-
PLOYED TO PREVENT ITS SPREAD—THE MANAGEMENT
OF PATIENTS AND SUSPECTS.

BY HENRY F. LONG, M. D., SUPERINTENDENT OF HEALTH OF IRE-
DELL COUNTY.

[At our request Dr. Long prepared the appended paper for the Health Conference at Winston-Salem. The request was made because Dr. Long, as Superintendent of Health of his county, had managed the largest outbreak we have had in the State in recent years so well that we believed his account of his methods would be of value generally, but especially to other health officers, who may at any time be confronted with the same problem, often a very difficult one where ignorance and prejudice and parsimony exist together. The reader will easily understand that our expectations have been more than realized. We commend the paper heartily and hope every one of our medical readers in this State where the conditions are the same will read it. They may have use for its suggestions very soon as small-pox is still in the country. The doctor refers to the terrible stench in the suppurating stage. Perhaps the slow burning of one pastile at a time in Schering's small formaldehyde lamp might help that. It is said to overcome odors, and at the same time to be imperceptible to the patient.]

To begin at the beginning, and I think it was the beginning, the first small-pox experience we, of Iredell, had, was when the negro Perkins made his way from Neal's Camp, on the M. & M. Railroad, to Charlotte. This camp was in Rowan County near the Iredell line. Perkins left the camp the day following that on which he had the initial chill, and of a certainty his progress was slow. By the time he reached Mooresville the eruption had appeared. One night was spent in the town and the journey resumed the next day. When within three miles of Charlotte his strength gave out, and Perkins fell by the wayside. Passers-by found him, reported the matter to the Mecklenburg officials, who immediately moved him to the hospital, where the patient died soon afterward.

As soon as I was notified of the occurrence I went to Mooresville, and, aided and assisted by the local physicians, went all along the line of the road and vaccinated all exposures that could be located. This was in February, I think, and nothing further was heard of small-pox until the last of April, when one A. B. Smoot, a colored minister, came to Statesville, and was found to have coherent small-pox. I was out of town when Smoot sent for medical aid. Dr.

Campbell went in my stead and diagnosed the case to be small-pox. Smoot said that he was just from Mooresville; the family there with whom he stayed had been sick with what had been called chicken-pox. However, Dr. Campbell decided that Smoot had small-pox. Next morning I saw the case and thoroughly agreed with Dr. Campbell that the case was small-pox. The house was at once put under quarantine. All exposures were detained and vaccinated. We hoped that the disease would be confined to this patient and the house where he was, but within two weeks Julia Dean, a colored woman living near where Smoot was confined, developed the disease in the confluent form.

At this time I went to see the cases in Mooresville that were said to be chicken-pox. No physician had attended them, but from all accounts of character, duration and termination of these cases, I judge that they had the discrete form of small-pox. The premises and clothing were thoroughly disinfected. The patients thought they had contracted the disease from Nathan Sloan, who lives near Troutman, N. C., a station on the A. T. & O. R. R., between Statesville and Mooresville. Sloan and his entire family had had chicken-pox early in the spring; he thought he contracted the disease from a man he met on the railroad. Sloan is a section hand, and the man he met, from all accounts, could have been none other than Perkins.

Within the week a case of confluent small-pox was, by accident, discovered at Belmont, a negro settlement two miles east of Statesville. An investigation disclosed the fact that there were five cases in the settlement. All these were put under quarantine. All the inhabitants of the settlement were vaccinated immediately, though the Sheriff of the county had to be called in to assist in this. It was learned that one Tom Rickert, colored, had stayed all night at Nathan Sloan's on his way home from work on the railroad, and a short time after reaching Belmont had been sick with an eruption. He passed through the different stages of the disease, recovered and had gone back to work before it was known that he had been sick. The first case discovered was his grandmother, who was in the fifth day of the eruption when first seen. A few days later six cases, all in the same family, were reported from Elmwood, in the eastern part of the county. The neighborhood was thoroughly and systematically vaccinated, this work being in charge of Dr. Burt Wood.

There was considerable excitement and anxiety in Statesville, yet very few of our citizens were willing to admit there was a single case of small-pox in the community. This seems contradictory, but it was the situation we had to face. The possibility of an outbreak of small-pox was greatly feared, but it seemed impossible for the public to realize that it had come. There was considerable opposition

to vaccination, and, as a rule, the most of it came from the whites. During the scare in February free vaccination had been offered the citizens and urged upon them. A great number of them took advantage of the opportunity, but the outbreak found many people who had never availed themselves of the only protection we have against this dread disease. For the moral effect it would have, I asked the town and county authorities to have the Government small-pox expert, Dr. C. P. Wertenbaker, of the Marine Hospital at Wilmington, visit us and examine the patients and make a diagnosis of the disease. We hoped that this would have a beneficial effect upon the doubting Thomases and arouse the public to a full sense of the situation and its duty in the premises.

To the efforts of our efficient Secretary of the State Board of Health more than anything else do we owe the prompt arrival of Dr. Wertenbaker. This expert made a careful and thorough examination of all the cases in Statesville, Belmont and Mooresville. The diagnosis that we had made was confirmed in every single instance. At the time of Dr. Wertenbaker's visit there were six patients in Statesville, five at Belmont, and three at or near Mooresville. Certainly there was no lack of material, and all the varieties of the disease that appeared during the epidemic could be seen among this number—the discrete, coherent and confluent forms of true small-pox or variola, as well as several examples of varioloid.

This visit of Dr. Wertenbaker to our town, and the report he made to the local authorities and to the Government was of inestimable benefit, not only to the health officials, but also to the community at large. To those of us charged with the duty of guarding the public health and protecting the community from the ravages of infectious and contagious diseases, it was the *sine qua non* of a successful campaign. It was especially of value to us, in that it caused to be placed in our hands absolutely the power to vaccinate with or without the consent of the individual; and aroused the interest of the county authorities to the extent that they agreed to build a suitable hospital and detention house. Previous to the coming of Dr. Wertenbaker the patients were quarantined wherever found. This but multiplied the centers of infection, and could not but conduce to the spread of the disease. In fighting small-pox nothing, or at least very little, can be done to stop the spread of the disease unless the health officer is given full authority to vaccinate as he sees fit, and is given a proper place to isolate patients and suspects.

It is due the people of Statesville and vicinity to say that the spirit of opposition exhibited by them toward vaccination, and the non-belief in the character of the disease, the uncertainty of the fact that it was really small-pox, was not so much their fault as it

may seem to have been. The unbelief was first expressed by certain of our physicians, and the laity are not so much to blame for the ideas they had. Some of these same physicians, who have not to this day seen a single case of small-pox, at the time of the outbreak declined to believe that the disease was small-pox; they hooted and belittled those of us who did believe. A laugh and a sneer are at times the strongest of arguments one can advance. When the audience wants to believe, even when the better judgment condemns, it is quite a task to overcome such arguments. This condition, much to our sorrow, is one which, I dare say, has confronted every health officer who has had the pleasure (?) of combating the invasion of his community by some one of the infectious and contagious diseases.

Dr. Wertenbaker and I conferred with the authorities in regard to how best the disease could be arrested in its incipency and stamped out. He recommended the erection of a hospital and detention camp, the compulsory vaccination of every person in the infected communities, and urged that the vaccination of all citizens should be insisted upon. Unless this was done at once, said the expert, there was little use doing anything. The city authorities had been in favor of this procedure, which I had recommended, but the county authorities had been slow to act. Both Boards met, appointed a joint committee, and proceeded to act upon these recommendations.

A suitable site for the hospital and detention camp was located about two miles from town in the midst of a large body of woodland. A space 300 feet square was cleared around the site of each building, and the houses were ready for occupation on the second day after the space was cleared. Each house was 25 feet wide and 50 feet long, and divided into two rooms each. The detention house was about one-fourth of a mile distant from the hospital. Each house had a separate water supply, which was furnished from springs, and the water was the best I have ever had the pleasure of drinking. A large branch, supplied by numerous springs, furnished an abundance of good, clean water for bathing and washing purposes. The road leading to the establishment approached the detention camp first, and then led on down the stream to the hospital. About 100 yards from the detention house, and between it and the hospital, was a tent which was used as a dressing room. Here the outer clothing was removed and the hospital costume of cloth shoes, heavy duck suit and head cloth were assumed when a visit to the hospital was made, or incoming patients and suspects were to be examined. Suitable guard tents and a commissary building, as well as a room for the physician in charge, Dr. R. A. Campbell, were also erected. The cook-house was placed about halfway between the

two buildings, the cooks being furnished from the ranks of the suspects. A horse and covered wagon were also furnished. The hospital was in daily communication with the town, and supplies were delivered at the commissary, which was built out of the zone of infection.

The patients were brought to the hospital in a covered wagon. Smoot, the negro preacher who brought the disease to our town, had by this time sufficiently recovered to be able to do this work. The patients were met by the physician in charge and examined carefully before being admitted to the hospital—a precaution which should always be followed, especially in time of an epidemic, for if the discovery of a new case occurs in private practice during a small-pox scare, the attending physician sometimes makes a very hasty and superficial examination. But for this rule a patient suffering from a severe and long-standing case of acne would have been placed in the hospital. I am certain the physician who saw the case made no examination, save from a distance, or he certainly would have discovered the fact that the man was not a victim of small-pox. After being examined the patients were taken to the hospital and placed under the care of the nurses, who rendered them whatever attention was necessary.

The suspects were also carefully examined on arrival and disinfected in person and clothing. They were required to bathe and were given a complete change of clothing, their own clothing being subjected to a thorough boiling and disinfection before being brought to the house and again worn. The bath was first with soap and water, with the thorough use of a surgical brush, then with a strong bichloride solution. Then the patient was vaccinated, previous vaccination not being regarded. The site of vaccination was examined every three days, and if there was no sign of a vesicle by the ninth day, re-vaccination was practiced. The suspects were examined morning and evening of each day. The date of their possible contact with the disease was ascertained and a record kept, and those upon whom the virus had no effect were objects of special care and watchfulness. The grounds were amply large for proper exercise, and the inmates of the detention camp were allowed to walk at will inside the guard lines. The guards were posted at the four corners of the clearing and it was, of course, their duty to prevent the patients crossing the line and taking French leave. We had no trouble at all in this respect, the suspects proving very obedient, and not one of them made even the slightest attempt to escape. They were allowed to amuse themselves as best they could, and seemed to succeed admirably. Usually they seemed to feel the restraint for two or three days, but after that would appear to grow accustomed to their surroundings and would patiently wait for the day of release.

The suspects were kept at the detention camp fourteen full days not counting the day of entrance and departure. When the period, of time had expired—corresponding to the maximum time of the incubation of small-pox—the patients were prepared for dismissal. The hair was cut short and each one was given a cake of soap, a brush and plenty of water. After a thorough application of these sanitary articles, they were bathed in a strong bichloride solution and given a change of clothing which had been previously disinfected. A certificate was given them, and they went on their way rejoicing.

The hospital was visited, as occasion demanded; never less than twice a day, usually many times. This of course depended upon the condition of the patients. A house full of small-pox patients is not the most pleasant habitation one could wish, and during the pustular stage it is especially a repulsive place. At one time when eight patients in one room and two in another were in the pustular stage, it was almost impossible to stay long enough to make the necessary examinations, etc. The stench was simply horrible. This in spite of the fact that the rooms were well ventilated and kept as clean as possible.

It might be well to describe the precautions taken when visiting the hospital. The outer clothing was removed in one compartment of the dressing tent, then we passed into the second compartment and put on a thick duck suit, and cloth shoes; a piece of cloth was tied carefully over the head, and another, folded over a pad of absorbent cotton, was placed over the mouth and nose, thus completely covering the head and face and only leaving opening enough about the eyes to enable one to see. Gloves were worn to protect the hands and wrists. Returning after the hospital had been visited, the suit was removed in the dressing tent, hands, neck and face were then washed in a strong bichloride solution, and the duck suit, shoes, and head cloth placed in a bichloride bath before the street dress was resumed.

Forty-two patients were received and treated in the hospital, six were treated at Elmwood, and fourteen white patients, the only white patients we had during the epidemic, were treated at their homes at Doolie, a small settlement in the southern part of the county. The venerable Dr. D. Burt Wood, an eminent and proficient physician of the old school, and a valued friend of mine, consented to take charge of the cases at Elmwood. Although he had retired from active practice on account of age, he consented to render his community and the county this one last arduous service. The cases in Doolie were in charge of Dr. Will White, who faithfully followed my directions in regard to the treatment of the patients and the disinfection of the infected houses. The cases at Doolie can

be traced to Tom Rickert, who spent a night at the place with a colored family just after recovering from his attack. This colored family contracted the disease. The mother cooked in a white family and brought the disease to them in her clothes.

As before stated, the disease was seen in two forms, *variola vera* and *varioid*.

I can say, with the experience gained from the observation and study of the sixty-two cases, that there is no distinguishing symptom or symptoms of the onset of this disease other than that of the eruption. The same symptoms are seen in the onset of malaria and typhoid fevers and la grippe, and the similarity is seen in the premonitory symptoms of dengue. The disease begins with a chill, followed by high fever, intense headache, and pains in lumbar region loins, and limbs. Nausea and vomiting are usually but not always present. There may be a chill on three succeeding days, or several chills in one day. The temperature rises rapidly, and may be as high as 104 degrees on first day. It is usually continuous, with slight morning remissions, or it may run a regular course as in typhoid fever, the temperature curve following a regular diurnal variation. The pulse is strong, full, and bounding, ranging from 100 to 140. The face is red, eyes injected and the skin is usually dry. The patient is restless and distressed and when sleep is possible has frightful dreams. Appetite absent; thirst incessant; constipation usually present. Severe initial symptoms do not always precede a severe attack of the disease. The tongue is usually moist and heavily coated, the color ranging from brownish white to brownish yellow, with the red papillæ showing very much as in scarlet fever. It is usually thick, heavy and swollen, often showing the impression of the teeth. The severity of the symptoms, the headache, pain in back and limbs, and the gastro intestinal disturbance may be so modified by vaccination during the incubation period that the patient will suffer little or no inconvenience and the rash itself may be the only noticeable symptom. There are no distinctive symptoms of *variola* before the eruption makes its appearance. The eruption is distinctive and the different forms in which it appears go to make up the three varieties of small-pox, which are:

1. *Variola Vera*.
2. *Variola Hæmorrhagica*.
3. *Varioid*.

Variola Vera is divided into four sub-divisions, according to the peculiar forms in which the eruption appears, as follows:

- a. Discrete, in which each pustule is separate and distinct.
- b. Corymbic, or where the pustules are in clusters or patches.
- c. Coherent, in which the individual pustules come in contact.
- d. Confluent, in which the pustules unite or flow together without a line of division between them.

In an ordinary case the eruption is completed and no new pustules make their appearance after twenty-four to thirty-six hours.

In the discrete form, generally on the fourth day of the invasion, small red spots make their appearance on the forehead, most often close to the hair line, on the wrist and ankle. The macules have the appearance of small red points, are slightly elevated, somewhat hard and rolling under the finger like a shot imbedded in the skin, and are effaced by pressure. Within first twenty-four hours they appear on other parts of the face, on the limbs, and a few on the upper part of the trunk. When the rash appears the temperature falls and the general symptoms abate. On the second day of the eruption, which is the fifth day of invasion, the red point is found enlarged and elevated and now becomes a papule. It can not be effaced by pressure, is hard and sound and preserves its characteristic form under any and all tests made by the finger. The third day of the eruption finds the papules changed into vesicles. Each vesicle is elevated, circular, the summit flat, clear, and filled with a transparent, serous fluid. In the center of the vesicle is a very small depression, the so-called umbilication. From its appearance the umbilication looks like it was the result of the puncturing of the vesicle with a small needle. For twenty-four to thirty-six hours the vesicles increase in size. On the fifth day of the eruption (the eighth day of the disease) the vesicles change into pustules, the umbilication disappears, the flat top assumes a globular form, and a milky or grayish-yellow color, owing to the pus contained in them. An areola of injection surrounds the pustules and the skin between them is swollen. Each pustule enlarges and becomes hemispherical; the base becomes broader and dark, and the skin around it much swollen and tumefied. The maturation follows the order of the appearance of the eruption. The swelling around the pustules causes considerable tension about the face, the eyes are often swollen shut, and there is, in consequence, much discomfort and pain. Coincident with the maturation there is a rise of the temperature, the secondary fever, and the return of the general symptoms. In the discrete form the temperature usually disappears after twenty-four to thirty-six hours, and by the tenth or eleventh day the temperature is normal and the stage of convalescence has begun. The pustules discharge their contents, collapse and dry rapidly. The scabs form, first on the face and then on other parts of the body, in order of appearance. This continues until the fourteenth day of the eruption and constitutes the period of maturation. The scabs begin to fall off and continue falling until about the eighteenth or twenty-second day.

Desquamation is usually completed by the twenty-eighth or thirty-first day. The scabs leave small red or livid spots, which gradually

become indentations or pits. In the negro these spots are often jet black and remain one or two shades darker than the surrounding skin, even after the completion of cicatrization.

In the confluent form the initial symptoms are the same, but more severe, and the rash appears on the second or third day. The earlier the appearances of the eruption, the more severe the attack. The papules may be isolated at first and only become confluent at a late stage of the disease. In severe cases the skin is swollen and hyperaemic, and the papules are very numerous and close together. On appearance of the rash the fever and general symptoms subside, but not to the same extent as in the discrete form. On the eighth day the temperature rises and the vesicles change to pustules. The hyperaemia is intense, the swelling of the hands and feet increases. The maturation of the pustules is complete by the tenth days, coalescence is established, and in place of numerous small individual abscesses, there is exhibited one large abscess which covers the entire skin of the head and the extremities. The temperature is high, 103 to 104 degrees, pulse 120 to 135. Thirst is incessant, and there may be delirium. Salivation is sometimes a complication of this stage.

The appearance of the patient is horrible in the extreme, it is almost impossible to paint a pen-picture which will convey to your minds an adequate idea of the terrible faces shown at this stage. The face is swollen out of all human semblance; the great swelling of the cervical lymphatic glands brings the throat out to and sometimes beyond the line of the lower jaw, the eyes are closed, and occasionally the swelling in this region is so great that only a crease in the skin, with a few eyelashes protruding, show where the eye is located; the external nasal apertures are all that is left of the individuality of the nose; the entire surface of the skin, supporting an immense abscess, is grayish-white in color. The odor is, in most instances, insupportable and tenacious, inconveniencing the patient as well as the attendants. In fatal cases, by the tenth day the pulse becomes weaker and more rapid, the delirium increases, there is subsultus, occasionally diarrhoea, and death intervenes. Hæmorrhagic symptoms may develop between eighth and tenth day, and if the patient passes safely through this stage, about the twelfth day the pustules break and the pus exudes and crusts form. Desiccation occupies the time from the fourteenth to the eighteenth day. The temperature falls and by the twenty-second day has again become normal. Convalescence is usually slow and may be prolonged to the second or third week.

Varioloid, or variola modified by vaccination, runs a regular course, as does variola; the difference is one of degree. Most often the patient is not even ill enough to feel the need of lying down. A

few days of indisposition, during the invasion, a headache more or less intense, and perhaps pain in back and limbs, but none of the symptoms are severe enough to inconvenience the patient for more than two or three days. The disease runs its course in eight days and desquamation has occurred usually by the twelfth day.

As regards treatment, there is little to say. Vaccination is the only agent, medicinal or otherwise, that has ever had any appreciable effect upon the course of the disease. The test of a remedy is, of course, the effect it will have upon a disease; whether it will abate or shorten the attack. One patient at the hospital, a child, was vaccinated three times in succession, none of which were successful, and twenty-two days after being exposed to variola had the initial chill, followed by the usual prodromic symptoms. All the vaccinations were made after the exposure. The attack was shortened appreciably, the patient being discharged on the fourteenth day. Two other patients upon whom the virus had been used unsuccessfully only two or three days before the initial symptoms appeared, did not seem to have been at all benefitted, and in them the disease ran its usual course.

The treatment of the cases at the hospital was in the hands of Dr. Campbell. In the main it was symptomatic. For restlessness, delirium, and insomnia, cold sponging and Dover's powder was the usual practice. The constipation was generally combatted by giving small doses of Epsom Salts and potassium bitartrate. A fever and diuretic mixture of potassium citrate, tincture of aconite root, and spirit of nitrous ether was given freely. The mild chloride of mercury was used as it seemed indicated. Quinine was used during the entire course of the disease in small tonic doses. Large doses of potassium bitartrate and bicarbonate of soda were used to combat any dropsical tendency. Several of the patients developed such tendencies, as a general rule the extremities being the parts so affected. Stimulants, carbonate of ammonia and alcohol, were used as indicated.

An attempt was made to combat the effects of the disease at least and, we think, this was not without success. Taking the position that the disease in the eruption and pustular stage is localized, the effort was made to counteract the effect of the poison in the pustule. For this purpose a solution of carbolic acid in vaseline was used. This was applied to the whole surface of the body twice each day, from the time the eruption appeared until the patient was discharged. This was not begun until several of the patients had reached the desquamative stage of the disease. It was used on at least thirty of the patients, and always with good results. Those of the patients upon whom it was not used are, some of them, terribly marked, while patients that suffered equally as severe attacks of

the disease, and upon whom it was used, show scarcely any scars. No especial claim is made for the treatment; we do not even claim that this will prevent the pitting of small-pox. We only make the statement that those patients upon whom this solution was used certainly are less severely pitted than those upon whom it was not used. It seemed to soothe and allay the persistent burning and itching of the skin as nothing else would.

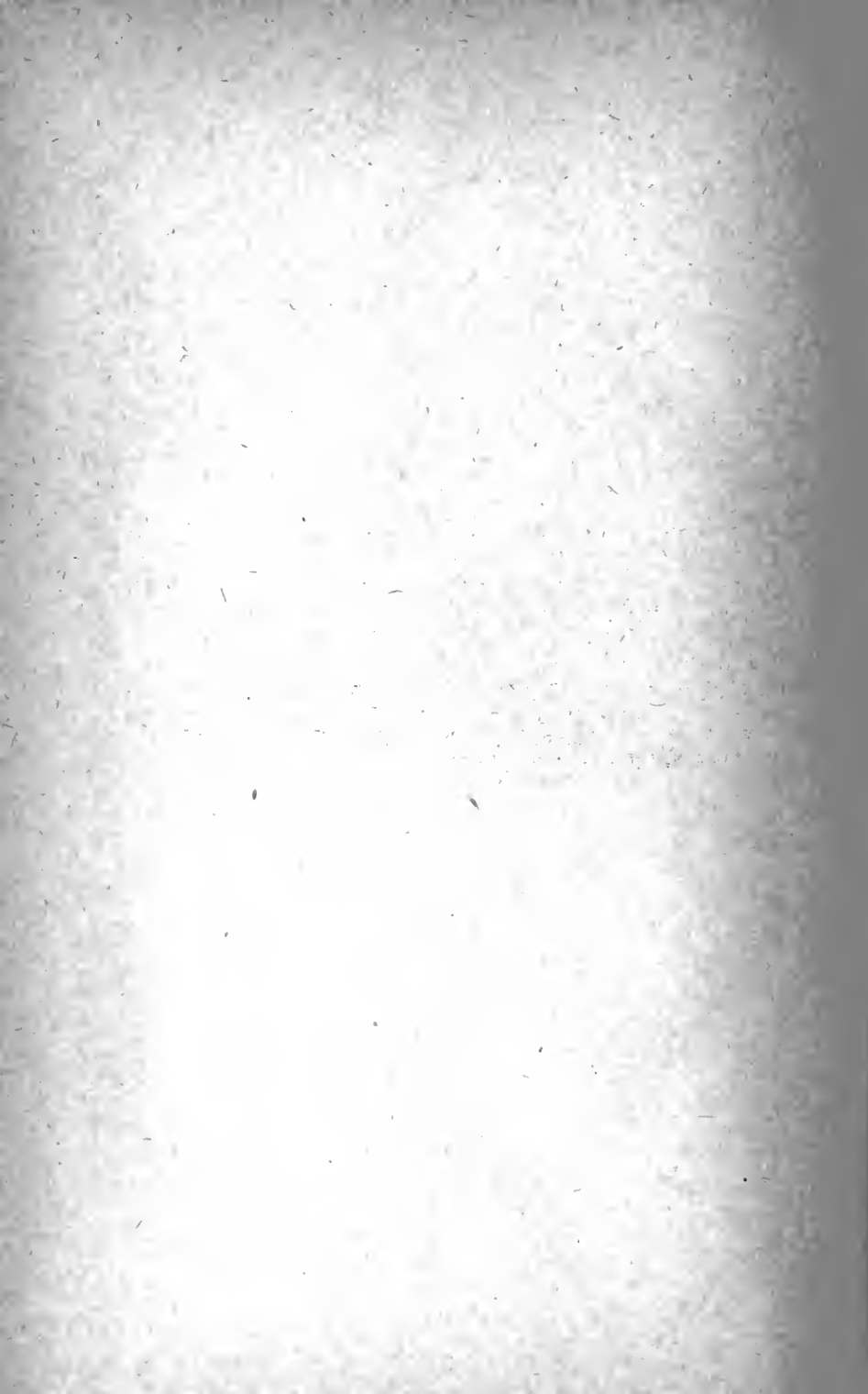
Complications were met as they appeared. Severe pyalism was met with in one patient. Laryngitis gave some trouble, but was never in the acute form. There were no bronchial, pulmonary or cardiac complications. Mental complications were seen in only one patient, and this persisted for some time after recovery. The most troublesome and disagreeable complication was that affecting the skin. Numbers of the patients had large crops of boils, that were of large size and very painful, one patient having as many as twenty large boils at one time. Catarrhal conjunctivitis was seen in three patients only and readily answered to treatment.

The fact that there was no mortality record in so many cases was an argument in the hands of many people that the disease was not small-pox. The season of the year doubtless accounts for this in a measure. The usual manner of death in this disease is by lung complications. The outbreak being in summer, the patients were not subjected to sudden changes in temperature while the surface of the skin was not in condition to protect the body. Acquired immunity, through the vaccination of parents and grandparents, perhaps, had not a little to do with the lack of mortality in these cases. Certain it is that a complication arising from the involvement of any of the vital organs would surely have resulted in the death of at least ten of these cases. As it was, the lungs, heart, and especially the kidneys, performed their functions as in health. These points were carefully watched and all precautions taken to keep them in normal condition.

The ivory points of the Dr. H. M. Alexander Co., of Marietta, Pa., and the fluid (glycerinated) vaccine of the Dr. H. Welcker Company, of Milwaukee, Wis., were used, and I must say that, in my opinion, there is no comparison. The fluid vaccine is unquestionably the best in every way. There were some very sore arms from the ivory points, but no bad results are known to have followed vaccination when a fluid (glycerinated) vaccine was used. The county used that which was made by the firm I have named, but fluid vaccine made by other firms was used in the community, and always with good results. Hence my statement. I think that none other than a fluid vaccine, purified by glycerine, should ever be used. The arm-to-arm vaccination gave no better results than the fluid vaccine, though it was superior in every way to the point vaccination. Seven

thousand and seven hundred vaccinations were made in the county and town.

In conclusion, I would like to say to the State Board of Health, if I can do so without the appearance of offering them unsolicited and unnecessary advice, that new and more strict legislation is necessary, particularly in regard to the infectious and contagious diseases. The County Superintendent should be given the power to establish a hospital for infectious diseases whenever he thinks it necessary, instead of waiting for county and city authorities to act, as the law is at present. More than this, a compulsory vaccination law should be passed, requiring the vaccination of all citizens every three years, without regard to previous vaccination. A vaccination scar should be the entrance card for every child that attends a public school, which it should be required to show before it enters the doors of the school house. Under proper laws and regulations it would not be many years until an outbreak of small-pox would be an impossibility. It is within the power of human beings to banish forever from the earth one of our most dreadful diseases. And thanks to the immortal Jenner this is possible. Yet we do not properly appreciate this great blessing. We certainly do not take advantage of it as we should. We owe it to ourselves and our posterity that we should do all in our power to at least free our State from the blight of this plague, and this we can do with only a little effort in the right direction. Speed the day when we shall each and every one of us, be immune and surely and safely protected from the ravages of this terrible scourge.

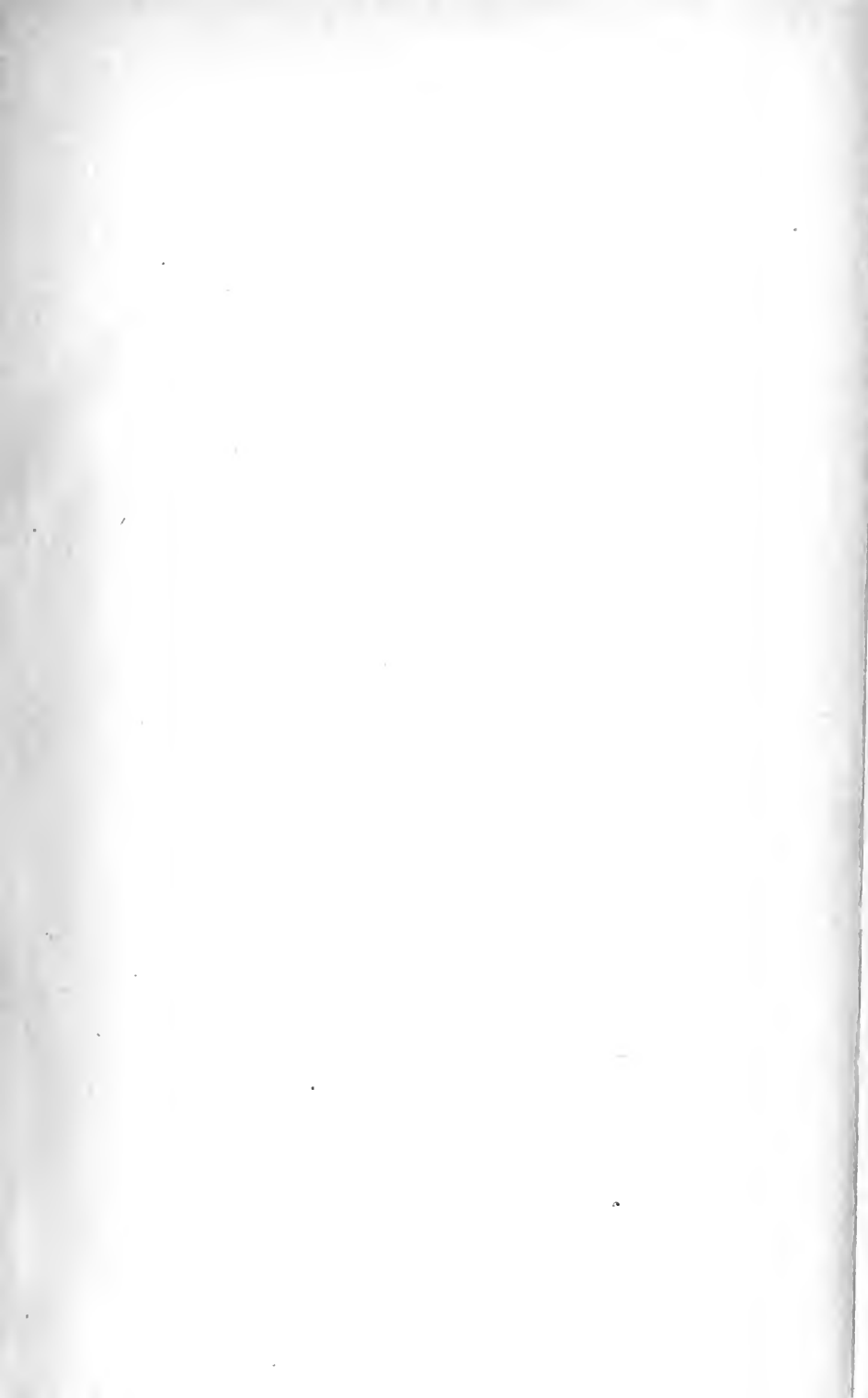


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